Implications of learning analytics for serious game design

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Serious Games

The difficulties (or challenges) of transforming outcomes, game quality and user appreciation into measures of learning outcomes achieved through SGs use have been a main barrier for successful deployment and adoption of SGs within formal education and corporate training.

Assessment in SG

In principle, all SG make use of in-game mechanisms for the assessment of player performance and progress, for an appropriate response to the player’s actions. They generate a large set of user data that could be used for monitoring and assessment purposes:
• Monitor the player’s progress in the game and assess the level of performance achieved (e.g. performance scores, levels).
• Game challenges or contents are adapted to the players’ actions; inappropriate actions may induce guidance like corrective feedback.
• When assessing performance in a game-play special attention must be pay since it does not necessarily imply effective learning.

Assessment in SG

Although some research has been directed to in-game and unobtrusive assessment methodologies that heavily relies on logging data to intermediate observable in-game behaviours to a competency-based score model which quantifies learning outcomes rather than performance. Stealth assessment allows the provisioning of feedback to players during the game play complying with implicit learning.

Still the assessment of learning in SGs is far from being straightforward and asks for additional methods and models that produce valid evaluations and evidences of learning in games, which requires additional player data.

Practical Example

- An off-line analysis had been carried out for the SGs games used by the Utrecht University.
- Three games were developed with the EMERGO SG engine (www.emergo.cc).
- With respect to the GLEANER components of data capturing, the rendered engine was capable of tracking and logging every single player action and the involved game objects and attributes.
- Retrieval of the component-based architecture of the GLEANER engine, an aggregator (GLEANER step 1) was built to generate a point database (GLEANER step 2) that stored a hierarchical relational database of events and associated variables (GLEANER step 3).
- Considering the nature of the off-line analysis carried out, we did not use itself to validate but inform software tools (GLEANER step 4) for data processing and reporting (GLEANER step 5).
- The evaluation (GLEANER step 6) consisted a comparison of a set of primary variables (e.g. total time spent, number of tasks completed and tasks execution times) in order to analyse player performance, feedbacks and variability of behaviours.
- The adaptation (GLEANER step 7) focused on the definition of a set of technical changes at system level for better meeting the actual SG requirements.
Conclusions

- The SG assessment main issues in relation to learning and performance evaluations and the need of detailed assessment models and user data for producing valid assessments of learning and how to take advantage of the LA tools.
- Research challenges still lie in the full exploration and validation of gaming analytics methods and tools, in particular in the development of full-time frameworks for adaptive gaming and personalized support.
- Full implementations and instrumentation of GLEANER-like approaches, focusing on the development of user-friendly tools for teachers or non-technical persons (e.g., by documenting the need of reporting and evaluation mentioned in the GLEANER model).
- The issue of LA interoperability across different games, genres, and platforms/engine is also an essential factor for a solid uptake of SGs in authentic educational and training settings.

Acknowledgments

This work was partially funded by the EU, under the Framework Programme 7 (Information Society Technologies - ICT), in the Games and Learning Alliance (GaLA) Network of Excellence, Grant Agreement no. 258169.

Thank you for your attention!

Questions?