

Half-full or Half-empty: Digital Entertainment Games for 21st Century Education

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Abstract: 21st century education has to be self-generating and self-sustaining, freely accessible to anyone, anytime, anywhere, and characterized by collaborative, two-way applied acquisition and mastery of productive and metacognitive knowledge, skills, and attitudes. As a medium of delivery, a digital entertainment game requires an integrated continuum of achievable roles including consumer, producer, and manager of content and activities in gameplay, community, management, and development. This paper identifies a variety of digital entertainment games which demonstrate some of these features, evaluates their potential value using our Game Regulated Applied Integrated Learning model, and discusses implications for selection and design of game systems intended for education.

Keywords: Agency, applied learning, collaboration, game-based learning, game design, game development, identity, integration, metacognition, presence, self-sustainability, user creation, user generation, user management

1. Introduction

Post-formal education is the term we use for teaching and learning systems and structures that supplement or replace traditional ones provided or regulated by governments and centered on the physical schoolhouse. “Learning by doing” and game based learning theories suggest that these types of education should as much as possible be self-generating and self-sustaining, freely accessible to anyone, anytime, anywhere, and characterized by collaborative, two-way applied acquisition and mastery of productive and metacognitive knowledge, skills, and attitudes (Schank et al., Gee, 2003, Castronova, 2007, Maher, Bilda, and Gül, 2006). This is 21st century education.

The reality of and need for post-formal education is implicit and explicit in the area of game based learning (Gee and Shaffer, 2010, Shaffer and Gee, 2005, Ondrejka, 2004). As a medium of delivery, it follows that an online game system should provide an integrated continuum of achievable roles including consumer, producer, and manager of content and activities in gameplay, community, operation, and development (Shaffer, 2006, Taylor, 2006).

Models are needed to assess the value of games and their features for post-formal education, both to select and to design games for educational purposes. In previous work, we have presented such a model: Game Regulated Applied Integrated Learning (Elwell, 2012).

Here we apply the GRAIL model to assess the suitability of several current and upcoming online games for post-formal education. Our objectives are, first, to summarize the GRAIL model and use it to derive criteria for assessing games, second, to apply these criteria to features of selected games, and third, to organize and evaluate our findings.

We present a summary of the GRAIL model, including theoretical foundation and criteria for assessment and design of games for post-formal education. Next we give descriptions of the games selected for this study and their relevant features. We then conduct assessment of those features according to the criteria of the model, followed by discussion of the results. Lastly, we present a conclusion, acknowledgements, and references.

2. Summary of the Game Regulated Applied Integrated Learning Model

2.1 Theoretical Foundation

Learning by doing (Schank et al., Gee, 2003, Gee and Shaffer, 2010, Shaffer and Gee, 2005), learning by making (Ackermann, 2001, Papert and Harel, 1991, Papert, 1987), and learning by teaching (Biswas, 2005, McGonigal, 2011, Schwartz, 2009), supported and bound together with learning by being and becoming (Shaffer, 2006, Chee, 2007, Chee, 2010), can form a continuum that maps well onto traditional concepts and practices of human learning and development. The Vedic stages of active life, *brahmacharya*, *grihastha*, and *vanaprastha*, or the guild progression of apprentice, journeyman, and master, for example, give the form of role and identity to stages of learning. This indicates an opportunity to incorporate and integrate these learning approaches into a single game system based on experiential learning (Kolb, 1984), where, for example, players participate in a society of agents (Smith, Maher, and Gero, 2003) that teach and are taught.

In our model (Elwell, 2012) of game regulated applied integrated learning, a pattern for developing and thinking about learning skills, relying on the elements of presence, agency, and identity, is established in game play, extended and applied in joining and managing game related activities and environments, and made interactive with the outside world (see Fig.1).

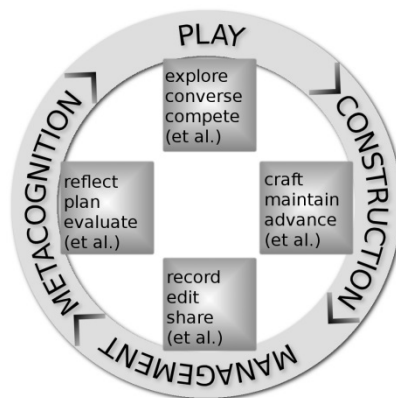


Figure 1. Integration of activities starts a cycle of doing, making, teaching, and becoming

The model prescribes certain features for a game system. First is basing character actions and development on a three stage process of taking on roles and developing identity through learning by doing, making, and teaching. Second is integrating this process with game related community and development activities in a user configurable environment that facilitates the application of game based learning to venues and activities around and outside the game, and ultimately to practical life disciplines and situations. Third is using principles of user generation, creation, design, and management to make the game system self sustaining and self generating, and its role in learning open-ended, as shown in Figure 2.



Figure 2. Cycle becomes helix as content and level of activities progress

2.2 Criteria

We will now identify criteria that can be used in assessing the suitability of particular game systems for post-formal educational purposes. Game systems will be assessed for features related to the model of a continuum of “spaces” within which gameplay and game-related activities and learning occur.

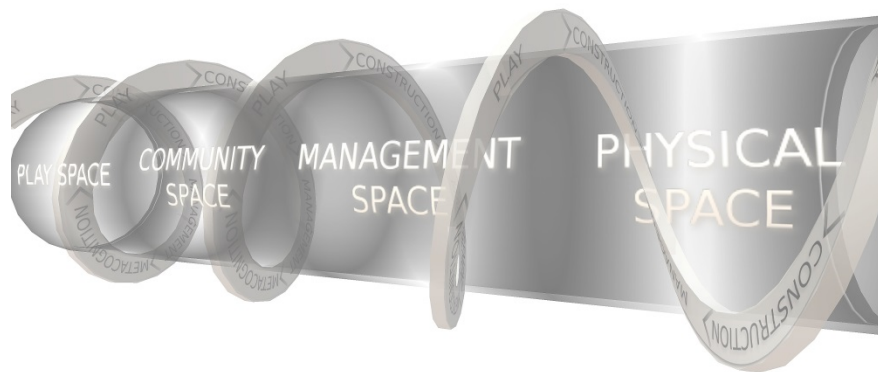


Figure 3. Integrated learning helix progressing along a continuum of spaces for application

As seen in

Figure 3., these are the play, community, management, and physical spaces. By leading apex players from sharing play content and “tips”, through media and game content creation and management, to the actual development and operation of the game system as an enterprise, knowledge, skills, and attitudes also progress from being applicable mainly or solely within the game system to ones applicable to planning, developing, and operating any sort of enterprise or activity in the social and media integrated world of the 21st century.

For this assessment, we will organize our criteria into the categories of:

- space integration – whether the game system includes and integrates content and activities of gameplay, community, and management (see Fig. 1)
- 7. player and learner integration – whether the game system attracts different types of players and learners (Bartle, 1996), and whether it rewards or requires collaboration among them
- 8. role achievability – whether the game system and enterprise provides a path for progressing from player to content or community creator or manager to professional
- 9. self generation and sustainability – whether the game system and enterprise allows user activities and content to substantially sustain or operate itself
- 10. applicability of learned knowledge, skills, and attitudes outside the game system

3. Selected Games and Features

3.1 Game and Feature Selection Criteria and Listing Format

We have selected seven games to represent a variety of genres and platforms, popularity, and features consistent with the GRAIL model. Each is listed by name, year of release, current availability, and payment model, followed by a simple description and features of special interest. We have not included games for which user content creation (“modding”) is popular but not facilitated by the game system itself.

Neverwinter Nights (2002, free to play and host after one-time purchase): implementation of tabletop medieval fantasy role playing game *Dungeons & Dragons*, with toolkit and client features allowing content construction from provided content, integration of player created content, player hosting and “dungeon mastering” of games; player content creators hired by developer Bioware as professional staff.

Second Life (2003, currently operating, free and premium membership): Not a game, but a shared virtual entertainment environment, characterized by real-time collaborative user creation of objects and scripted functions, user ownership of created content, and two-way convertible currency (Elwell, Cook, and Medeni, 2007, Leigh, et al., 2010).

Team Fortress 2 (2007, currently available, free to play): Character class based capture the flag game requiring collaboration among different play styles, map tools included, sale of player created content in company store with profit sharing.

League of Legends (2009, currently available, free to play with paid premium content): Multiplayer Online Battle Arena (MOBA, a subgenre of realtime strategy) game in which players choose “champion” characters with specific abilities to join teams competing to destroy each other's bases; professional “eSports” play, video-streamed for player and fan audiences, involves integration of player webcam images and other elements into the game UI.

L.A. Noire (2011, currently available for purchase for Xbox): a single player epistemic game (Shaffer and Gee, 2005) using groundbreaking visual and sound elements to immerse the player in the role of a police detective and fostering metacognitive learning through emphasis on observation, reflection, and consequences of actions and choices.

BioShock and *BioShock Infinite* (2007 and 2012, currently available for purchase): first person single player games with stories, environments, and gameplay features intended to foster learning and reflection on philosophical and ideological movements and themes, providing an example of how such games can be intentionally designed to effectively achieve pedagogical goals.

TUG (The Unnamed Game) (2015, free to play and host): “a multiplayer open-world sandbox-RPG using new technology and social sciences to directly involve players in the game’s design” (Nerd Kingdom, 2013) crowd-funded via Kickstarter and in open alpha as of this writing.

(Note: Since we assume their features to be well-known to readers in the field of game based learning, neither *Minecraft* nor *World of Warcraft* is included in this study.)

4. Assessment

Table 1 presents assessment of each selected game according to the criteria derived from the GRAIL model. The levels of assessment are as follows:

- None – the feature is not present in the game system and enterprise
- Fair – the feature is present but not sufficient to be useful in education
- Strong – the feature is sufficient to be useful in education
- Complete – the feature is sufficient to fully meet associated GRAIL criteria

Table 1: Features of Selected Games Meeting Criteria of the GRAIL model.

	Space integ.	Player type integration	Role achievability	Self generation	Applicability of learning
<i>Neverwinter Nights</i>	Strong	Fair	Complete	Complete	Strong
<i>Second Life</i>	Strong	Fair	Strong	Complete	Complete
<i>Team Fortress 2</i>	Fair	Strong	Strong	Strong	Fair
<i>League of Legends</i>	None	Fair	Fair	None	Fair
<i>L.A.Noire</i>	None	None	None	None	Strong
<i>Bioshock</i>	None	None	None	None	Strong
<i>TUG*</i>	Strong	Strong	Strong	Strong	Strong

* *TUG's* assessment values reflect projections and claims of its developers (Nerd Kingdom, 2013)

Discussion

We found that, while each game had one or more features suitable for post-formal education, none had sufficient applicability or integration to be considered as an “off the shelf” structural supplement or replacement for traditional schooling. Moreover, we found no chronological trend in that direction

on the part of developers and distributors of digital entertainment games.

In fact, the game with the greatest suitability was *Neverwinter Nights*, released in 2002 and no longer supported by its developer.

The currently most popular shared virtual environment game, *League of Legends*, has successfully spawned a rich and active learning-based community – and even professional play, but lacks integration of player generated affordances and media. Player-streamed gameplay videos commonly involve the player not simply superimposing, but integrating his own content into the game's UI, including a webcam of himself. This integration occurs, however, separately from the game system. Moreover, relatively few can hope to become professional players, and no path is provided to achieve other professional roles using knowledge, skills, and attitudes learned in the game system.

Shared virtual entertainment environment *Second Life* has actually downgraded or abandoned features, such as real-time collaborative content creation, creator ownership of content and services, educator discounts, and convertibility of in-world currency to “hard” currency, that had made it interesting and useful for post-formal education (Elwell, Cook, and Medeni, 2007).

Conversely, upcoming game TUG explicitly draws on game based learning for foundation of its design and philosophy of its goals, and promises features consistent with the GRAIL model. It is possible that new and emerging business models such as “crowd funding” may clear the way for new pedagogical and learning models in digital games.

Conclusion

This paper applied the Game Regulated Applied Integrated Learning model to assess several current and upcoming digital entertainment games for use in 21st century education. We summarized the GRAIL model and used it to derive criteria for assessing digital entertainment games, applied these criteria to selected games, and organized and evaluated our findings.

We found that the overall integration called for by the model does not appear close to fruition in digital entertainment games. On the other hand, while no single game in the market or in development offers all the specific features GRAIL requires, nearly all these features can be found in one or more games. Moreover, no technical or market obstacle exists to prevent integration of such features in the near future. In this sense, we conclude that the metaphorical glass is indeed both half-empty and half-full.

Our findings have significance for selection of commercial games for educational purposes. The GRAIL criteria provide a rubric that can reduce uncertainty and trial-and-error in selecting games for teaching and learning by helping educators to “ask the right questions”.

Most significant, however, are implications for game design. Crowd-funding offers an example of the opportunity for new game design and business models to be explored, including ones explicitly involving concepts and philosophy from the field of game based learning and suitable for post-formal education.

Use of the GRAIL model in deeper case study of particular digital entertainment games is indicated as future work.

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