From the Games Industry: Ten Lessons for Game-Based Learning

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ABSTRACT

This paper draws on lessons learned from the development process of the entertainment games industry and discusses how they can be applied to the field of game-based learning. This paper examines policy makers and those wishing to commission or develop games for learning and highlights potential opportunities as well as pitfalls. The paper focuses on ten key points in which the authors feel from experience in both commercial game development and education that parallels are drawn between the entertainment and educational games development processes.

Keywords: Education, Development, Game-Based Learning, Games Industry, Process

INTRODUCTION

The conception of computer games in education dates back to the 1950s with the integration of war-gaming and computer science research, coupled with the emergence of educational theories that emphasise active learning. The first computer games were developed in the 1960s and soon after they were being used and developed for educational purposes (Wolfe & Crookall, 1998). Educational games and simulations have been used for many years in business, training staff in financial and economic skills, and in the military for combat and strategy training. Americas Army, published in 2002, is arguably the most successful serious game produced, and the health sector has used simulation and visualisation techniques for many years, for example through the use of virtual patients. However, rigorous academic study of digital games, from a variety of perspectives and disciplines, is still very much in its infancy.

The development of appropriate games for learning, in which the gaming and learning outcomes are closely aligned and are fit-for-purpose for specific teaching situations, is difficult. Commercial off-the-shelf (COTS) games often have too much irrelevant content and a steep learning curve while, at the other end of the spectrum, the creation of new games specifically for learning requires expertise and expense. There are problems also in the attitudes of institutions, parents and professional bodies towards the use of games for learning as they can be seen as trivialising the curriculum in an increasingly target-driven and scrutinised environment. If games are to be taken seriously as an educational tool it is essential that development

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models emerge that enable high-quality games to be produced—in terms of educational value, game play design and appropriateness for the target audience.

Educational games are commonly produced by specialist game-based learning and e-learning development companies, or by enthusiastic teams (or even individuals) based in educational institutions. Entertainment games companies rarely venture into the field of educational games because the potential markets are smaller than for entertainment games but many of the lessons learned from the industry could be equally applied to the processes by which games for learning are developed.

This paper aims to highlight some of these lessons. It is aimed at those interested or involved in the creation of games for learning as well as those developing policy in the field and commissioning educational games. It considers what might be learned from the entertainment games industry in terms of the development of educational games, focussing on the process of game creation, and specifically not on the design elements. A great deal has already been written on ways in which to harness the motivational and engagement factors of entertainment games to enhance learning (Malone & Lepper, 1987; Garris et al., 2002; Dickie, 2007) so that will not be dwelt one here; this paper will focus on the development process rather than the product. Also, while the authors recognise the rich history of paper-based games, the scope of this paper is limited to digital games. The points that are made in the following sections do not purport to be unique to the entertainment games industry, but they are simply areas in which the authors feel that those creating and commissioning games, might learn valuable lessons from a related industry.

BACKGROUND

Games consoles, personal computers and other games devices are becoming ubiquitous items within most homes in western society. Over 65% of US Households play video games, globally over 138 million Playstation 2 consoles have been sold and over 155 million console games are sold each year (Online Education, 2009). The video games market in the UK now outsells the film industry (Wallop, 2009). Commercial games designers have the ability to create highly engaging, immersive experiences where players keep coming back to for more (something that is sadly rarely the case in formal education). What constitutes a “good” computer game is arguable; (Koster, 2004) suggests that “fun” is an essential criteria (Prensky, 2007) talks about engagement and immersion, indeed it could be argued (sic) that sales volume measurement is a useful indicator of a good game. Suffice as to say the question of “goodness” is outside the scope of this paper.

In much of the academic literature on games-based learning one of the key reasons given for using games to teach is their motivational qualities (Oblinger, 2004; Prensky, 2007). However, this assumption that digital games are inherently motivating is challenged in reality. While games may motivate some learners, they are off-putting for others, who see them as a waste of time or inappropriate for academic learning. This may be particularly true the case of older learners who may have more limited time and are perhaps more strategic in their learning aspirations (Knowles, 2005). It also cannot be assumed that because an individual is motivated to play games in his or her leisure time that he or she will want to play them to learn something, or that the types of game played by choice will be appropriate for formal learning (Whitton, 2010). So while the motivational appeal of games may be present for some people, the primary reason for their use in teaching and learning must be because they have pedagogic value. Computer games offer the opportunity for players to explore, collaborate and problem-solve in massive virtual environments with immediate feedback and support as they move from easy to progressively harder tasks.

Research has suggested (McFarlane et al., 2002; Sandford & Williamson, 2005) that the use of games in formal teaching situations may
present problems because it can be difficult to find appropriate games for specific teaching situations and they can be time consuming to learn and complete. The link between the game outcomes and the learning outcome must be strong because otherwise, while students could be engaged in playing the game they may not learn what was intended. Educational games also need to be designed in such a way that the focus is on learning from the game, not in learning the game itself, and learning processes such as reflection and collaboration need to be explicitly designed into the game play (Whitton, 2010). For these reasons, it can be challenging for teachers and other educators to find appropriate games with learning outcomes at the right level, which fit within the practical teaching constraints of a given situation.

There are a range of approaches to finding appropriate games: from using commercial games, either those designed for entertainment (Squire & Barab, 2004) or those designed explicitly for learning (Whitton & Hynes, 2006) to those created using modifications of commercial games (Robertson & Howells, 2008) or those developed from scratch (Ebner & Holzinger, 2007). However, each approach has its drawbacks: there are a limited number of commercial educational games available, games designed for entertainment may not map closely to the desired learning outcomes and curricula and the cost and expertise required to create bespoke games may prohibit this option for the majority of teachers.

There are historically several differences between games designed for education and those console and PC games designed purely for entertainment. One major difference, however, is still the amount of money spent on design and production: entertainment game budgets typically run into the millions of pounds, while that spent of educational games is significantly less. Major commercial entertainment games companies are unlikely to be prepared to invest equivalent sums on games for learning as there are simply not the same potential markets (although there is also now a growing market in the development of amateur or cottage industry web games with low budgets and simple production values, but focussed strongly on game play and originality).

The recognition, belatedly, by the industry of the social impact of gaming and the potential positive contribution it has to make to society is leading to the growing acceptance of educational games as having a legitimate place in the industry as they can be shown to have commercial potential. The market for educational games is at present small but the rise in popularity of “casual” games, which allow players to engage in bite-sized chunks, are challenging the notion that there is “no market,” which has been the default position of industry for many years.

However, commercial educational games have tended to be based on the tried-and-tested task-reward structures and behaviourist principles, which relying on extrinsic motivation rather than learning integrated into the game design itself (for example Nintendo’s Dr Kawashima’s Brain Training). This means that the full educational potential of games to create exploratory learning environments where players can actively engage in problem-solving and creative tasks is not being reached by the majority of educational games produced commercially for the mass market.

While educational game developers are certainly paying more attention to the games industry over the last decade than previously, there are still problems with bridging the gap. These include academics concerns regarding the application of disruptive technologies not necessarily embedded in existing academic research and teaching practise, the levels of risk typically associated with commercial games development being unacceptable in academia, and the prohibitive costs and/or expertise required to produce a game with the appropriate production values and game design quality to be acceptable by some target learner groups.

This paper suggests ways in which the educational games development community could learn from the entertainment game design community, although the metrics applied to define success by the games industry and education sectors differ markedly, which
presents a challenge in making the transition. It highlights some of the harsh realities of an industry that is sales-driven, as the metric for success historically has been the number of unit sales (although this business model is currently being challenged by contemporary commercial models, such as the use of micro-payments and digital distribution, which advantage smaller developers).

An area in which the creation of games specifically designed for learning is becoming more feasible is in small companies that specialise in the design of educational games or rich media to support computer-enhanced learning, or in similar departments based within educational institutions. In many cases the individuals working in these units have a background in other areas—such as learning design or online learning development—and may have little or no experience of the commercial entertainment games industry. This paper considers the game development process and argues that there may be things that educational game designers—and those commissioning educational games—can learn from looking at what is common knowledge in the games industry.

LESSONS LEARNED FROM THE ENTERTAINMENT GAMES INDUSTRY

This section presents a list of ten areas in which the authors feel that educational game developers, and those commissioning games for learning, could have something to learn from the processes of the entertainment games industry. The list was created as a result of the authors’ experiences of over twenty years in game development coupled with extensive experience in education, pedagogic design and research. This list does not purport to be complete or to be elicited from first-hand research, although it is grounded in relevant contemporary literature. It simply aims to provide practical guidelines to those involved in the development of educational games, highlighting that can themselves learn something from a different discipline.

1. Appreciate the Importance of a Known Brand

The sales of entertainment games have historically been entirely dominated by expensive licensed well-known brands, either characters native to the games industry or those taken from the media and film industries. Particularly in the context of games for children, it is important to recognise the endorsement these characters give a game, both in terms of establishing the credibility of the game and in setting and meeting learner expectations. While a connection to a known brand may not ensure that a game will be engaging over long periods of time, it will certainly contribute to the initial motivation to play the game.

However, the use of existing characters, licenced properties or established intellectual property in educational games is prohibitively expensive. They may also be off-putting to learners who have preconceived notions of what games involving these characters and properties involve, for example arguably sexualised characters such as Lara Croft or overtly masculine licensed properties such as Call of Duty or FIFA.

The lesson for educational game designers is that association with a brand can help to ensure an audience, but that selection of brands for the specified target audience must be appropriate. Players are sophisticated in their affiliations and will be unlikely to be fooled by using a copycat version of a popular character to make a game appear motivating—at best it is likely to be amateur and derivative. Creation of original characters is by no means trivial and getting it wrong could mean that learners will not even start to engage with what is otherwise a good learning game, but a focus on original character development can provide one solution if carried out robustly and with a deep understanding of the target user group.

2. Focus on Adding Value

The practice of creating online materials and interactive learning content from scratch is still
common in education. While this is a waste of resources for the creation of learning materials, when it comes to the design and development of computer games, which are expensive in terms of development time and expertise, this can become ridiculous. Creation of computer games requires specialist skills, is extremely time-consuming and expensive. It is simply not sensible to develop every aspect of a game from scratch, particularly when easily-available middleware, modding engines or existing multi-user virtual environments (MUVEs) such as Second Life will probably do the job better at significantly less cost (both financial and in terms of team sanity).

The focus of educational games development needs to be on adding purpose and value rather than creating the underlying game mechanics (e.g., a new physics engine or rendering algorithm). Use of existing middleware where possible will allow developers to focus on adding new value, specifically being able to focus on creative game design, interaction and learning design, and not re-inventing the wheel. Instead of devoting energy to recreating the underlying game mechanics, additional resources such as example case studies, or suggestions for how to integrate games within the curriculum, could be provided with games and increase both the likelihood that they will be used (more widely) and that their use will be more effective in educational terms.

3. Remember the Reason for Creating a Game in the First Place

It is important not to lose sight of one of the reasons for using a game to learn in the first place—as well as providing pedagogically-sound active learning environments, computer games also have the potential to motivate and engage learners (Whitton, 2010). However, in the case of game-based learning (a sub-set of so-called “serious” games) it is often the case that the serious is over-emphasised at the expense of engagement. While it can be a difficult balancing act to create a game that retains its engaging qualities and is not seen as frivolous or inappropriate for formal education by at least some of the target learners, it is important to acknowledge that serious need not equate to boring.

Many educational games or edutainment titles produced are reliant on extrinsic motivation factors, through “game” rewards for the completion of “learning” tasks. While extrinsic rewards are an integral part of the rules of play (Salen & Zimmerman, 2004) fostering intrinsic motivation, where the game play and learning outcomes are intrinsically linked, is to the game experience (Crawford, 2003) and fosters deeper learning (Cordova & Lepper 1996; Hapgood et al., 2005).

A mistake that is sometimes made with entertainment games is to try and make them over-realistic—at the expense of game play. For example racing games would become unplayable if they required the player to have the skills of a real racing driver, but are toned down to make them fun to play (Dormans, 2008). There is a balance to be struck between the amount of realism necessary for a game to be acceptable and for the learning from the game to transfer into real life (this will, of course, depend upon the type of game used and whether the skills are actual or abstract).

4. Work with Developers who Share your Conceptual and Cultural Frameworks

When designing games for learning, it is important not to lose sight of what is trying to be achieved in terms of learning and in what contexts the game will eventually be used. Games designers typically work from a clearly-defined conceptual brief, often driven by mechanics and narrative, while educational designers work on learning outcomes and assessment criteria. Game-based learning products must be a synthesis of these, so an understanding of the two cultures—and where they might clash—is essential. Working with a team that share the same vision, goals and cultural norms is key in any game development, but crucial in the field of educational games, where there is a
potential clash of expectations and practices. It is important that each takes time to listen to and respect the skills of the other in the development of educational games. The results of not doing so can be graphically stunning games that are pedagogically trivial or educationally-sound games that are so complex and boring that they are hardly games at all.

It is important to recognise that educational computer games require a range of hybrid and cross-disciplinary skills in order to great engaging games that are appropriate for learning. Where this skill mix cannot be achieved within an existing team it may be necessary to build partnership or relationships with others. While different views and opinions among team members can lead to healthy critical debate and overall a better product, problems can occur when individuals do not share an underpinning ethos. There is a potential tension between designing games for fun and designing games for learning and it is crucial to make sure that the people designing educational games want to be doing that and have a real passion for learning, and not people who really want to be designing shoot-em-ups.

5. Trust the Intuitive Creatives

The design of effective and engaging games contains an element of "art" and "craft" as well as "science." Commercial games are invariably the concept of one person’s intuition, the lead designer, or a small group of individuals, for example Peter Molyneux’s Black and White or Shigeru Myamoto’s Mario games. There is no reason why this principle should not apply to educational games too. Designing games in large groups or with multi perspectives, objectives or desired outcomes is problematic so it is crucial to have a single person who leads the project and holds the vision of the game (Blenkharn et al., 2006). The process of developing a game design concept is not necessarily a collaborative one and it is crucial to trust the people whose job it is to do it. Games should not be designed by committee.

6. But... Make Sure that Risk-Taking is Measured

Having said that it is important to trust the intuitive creatives, it is also important to appreciate that education is not the appropriate arena for extreme risk-taking. At one end of the spectrum, games for learning, particularly for younger age groups, are typically designed around a structure of levels and rewards, sticking to the principles of behaviourist approaches to game design. In terms of game design this type of framework is tried-and-tested, relatively easy and cheap to implement and re-usable in different contexts because the learning is divorced from the game dynamic. However, it may not be the best pedagogic approach to adopt as it is difficult to support deep learning without a close integration between the goals of the game and the learning goals.

At the other end of the scale, entertainment game developers are pushing the boundaries of what is possible in terms of graphic design, interaction methods, and game mechanics. These innovations can be extremely innovative but also involve a high level of expense and risk. In terms of games for learning, there are challenges, related to implementation, of accommodating diverse pedagogic approaches. For example with a constructivist pedagogy, to create games that support collaboration, problem-solving, learning through experience, and reflection or the process by which knowledge is constructed by the mental activity of Learners (Driver et al., 1994), before innovation in game design is even considered. There need to be established paradigms for the effective design, development and implementation of constructivist games first, and more research is needed before their use can be seen as mainstream or good practice can be established.

While it is not necessary to always conform to game development conventions of frameworks, and educational game designers should not be afraid to innovate, game-based learning is a field in which extreme risk taking or technical innovation may not be appropriate.
7. And... Say No to Feature Creep

Again, this may seem to go against the point about trusting intuitive creatives, but there must be a balance between initial flexibility and creativity and the ability to effectively plan and manage a project over its life cycle. Feature creep, where additional functionality keeps being added over-and-above the initial agreed specification, has prompted the premature burial of many a great game. It is always tempting to add additional functionality to a specification while a game is in development, which is why it is essential that it is tightly specified at the start. Both those commissioning games, and those developing them, need to keep their personal urges in check.

The author, from personal experience, sites two examples of this: Black and White on the Playstation console (over two and a half years in development to a point where console technology development superseded development of the game) and an Isle of Mann TT simulation in development for nearly five years (mapping and accurately simulating all 36.2 miles of the course proved time-consuming and prohibitive).

Remember that what is cool may not be educational and there is a need to balance motivational and educational values—what the developer or commissioner believes to be cool may be very different from the perceptions of the target audience. Thorough and detained planning, specification and documentation is essential to ensure that the game originally envisaged, meeting the learning outcomes intended, is developed without getting sidetracked down routes influenced by the personal interests or perspectives of teachers or developers.

8. Know the Audience

The entertainment games industry is notorious for lack of engagement by users in the development process (in a sense, this point is a lesson from the games industry in how not to do things). A deep engagement with target audience is essential to ensure that a game developed is appropriate, acceptable and accessible.

It is easy to make assumptions about certain groups such as “digital natives” or the ‘games generation’ without really understanding their needs or preferences. This is particularly important because of some of the assumptions that surround the use of games-based learning regarding engagement and motivation. It is not the case that all learners will find something motivating simply because it is a game (Whitton, 2010). A clear understanding of the target learner group is essential for educational game design, particularly in post-compulsory education, because if it is not seen as an appropriate way to learn, many learners will simply not engage at all.

It is crucial not to take the audience for granted or rely on “targeted focus groups,” which are groups representative of potential buyers of games who are provided with Beta versions to test usability and playability. This is problematic in that this small subset of users are often comfortable with game concepts, and accustomed to the interfaces and with the genre of game, which this can inhibit objective feedback. Diverse learner groups in education present a much greater challenge.

Involving learners in the game development process, through participative design, is a key way in which to meet higher-level learning objectives while creating a game that is tailored for its target audience. When collecting feedback from educational games it is crucial to make a distinction between people who liked the game and those who learned from it—as these can be very different.

9. Decide how Success will be Measured

The primary focus for measuring success in the entertainment games industry is sales of a game. However, this does not distinguish between those who bought the game and played it once and those who engaged deeply. While this single measure is perhaps unhelpful in the context of educational games, what it does highlight is that there needs to be some objective way of evaluating whether any game created
has achieved its goals or had an impact. It is important to this about how success will be measured at the start.

It is also crucial that impact is not judged solely on quantitative measures such as number of downloads or users, as this stifles creativity and innovation and does not give a full picture of the educational impact of the game. The use of qualitative evaluation techniques increases the engagement with users and moves beyond simply measuring how much a game is used to understanding the rich nature of learner engagement with it.

Curriculum imperatives, which are often politically driven, are often also the driver for educational game development, meaning that games may quickly become obsolete as emphases change. It is better to create something that is reliable and tested in terms of pedagogy, game design and technological platform than to simply be jumping from bandwagon to bandwagon.

10. Be Prepared For Failure

In the entertainment industry, it is accepted that not all games will be a success (in terms of sales). The experience of the authors suggest this figure to be in the region of eighty per cent—there are games that “burn brightly,” games that are “slow burners,” but mostly games that simply “burn out” (this rate may, of course, be related to the general failure to engage with the target audiences). It is questionable whether this would be seen as an acceptable failure rate for educational games. Commercial success may also not imply successful learning and it may be a difficult balancing act between creating a product that is commercially viable and one that meets its intended learning goals.

It is difficult to gauge failure rates in the same way in education as the “profitability” is simply not an issue—even in Higher Education institutions the costs and incomes of individual courses or modules is often not calculated. What is certain is that an 80% failure rate would simply not be acceptable in terms of the metrics that are used in education, such as student retention or learner attainment. Perhaps educationalists need to accept and examine failure more critically, as is done in the games industry, to learn from it rather than it being seen as something that is unacceptable—if there is not a climate where it is okay to make mistakes (and learn from them) then innovation and creativity simply will not happen.

CONCLUSION

This paper has aimed to highlight ten areas in which those involved in developing or commissioning the development of educational games could learn from the commercial entertainment games industry. Although this is not intended to be a comprehensive list, it is intended to highlight that there are some lessons that can be learned from other sectors and that those involved with creating games for learning could avoid making many of the mistakes already made.

The development of any game is not an easy task, creating the right balance of game mechanic, aesthetics and brand appeal. This equation is further complicated by the addition of learning outcomes and the practicalities of embedding the game within a teaching context. As well as focussing on what can be learned from the design of entertainment games, there is also much that can be learned from the development process. Educational games are an expensive way to teach and developers need to focus on where they can add the most value to the learning process, be it in terms of motivation, engagement or pedagogic design.

In the future bespoke development may be in the means of more and more educationalists and smaller teams within or outside of institutions. It is important, therefore, that the games research community focus on what elements of games really add value to the learning experience, and build on the large amounts of research (albeit typically “non-academic”) that is continually being undertaken in the games development industry. A critical awareness of this (and other related) sector will allow educators...
to take account of lessons already learned and avoid making the same (often costly) mistakes.

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