Experiential eLearning: An ID Model for Serious Games

“If you tell me, I will listen. If you show me, I will see. But if you let me experience, I will learn.”

- Lao-tzu

Preface

Simon Egenfeldt-Nielsen, who has studied, researched and developed serious games for the last 15 years, has written this white paper the use of Serious Games for capacity building.

He holds a PhD from IT-University of Copenhagen and is currently CEO of the company Serious Games Interactive that he founded in 2006. So far he has been involved in developing +25 serious games.

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Introduction

Serious games is an emerging area that covers a number of related fields (e.g. game-based learning and simulations). The common denominator is to harness the potential of game mechanics and games technology for creating stronger learning experiences. The focus is on motivating and engaging the learners to ensure that; they learn more, remember what they learned better and are able to use it actively.

There is not a single unifying theoretical foundation for learning through games (there is at least three overall frameworks1), but the model presented in this paper extends from the experiential learning theory as formulated by proponents like Kolb, Lewin, Dewey and Vygotsky2.

Over the years e-learning vendors have often with success used interactive games as a part of the learning experience. However, in classic e-learning projects games are a small component of the overall solution that is usually used for communicating a very particular point, training a specific skill or to spice up the experience.

In recent years the elearning field have taken games more seriously as something more than just an add-on3.

The DNA of Serious Games

Basically, serious games can be described as what many elearning applications aspire to be. In serious games you will see a number of the more classic elements from elearning (diagrams, quizzes, images, text, hyperlinks and assessment), where these are appropriate. However, the overall experience will be tied more close together as a game, where you solve problems and progress through a storyline. The crucial difference between serious games and

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3 One of the better introductions are Mayer & Clark (2008): E-learning: Science & Instruction. Pfeiffer. Although they are still talking from an e-learning perspective.
other elearning applications is serious games’ focus on creating a meaningful, relevant and engaging learning experience. Often visuals are an important element in this experience, but this is not necessarily the case in all serious games.

In a serious game you still have clear learning goals but they are embedded in a meaningful context, where you have to apply knowledge to succeed. This makes the game more approachable for users that are not usually involved in learning. Furthermore, studies indicated that retention is better from serious games than other learning forms.

A serious game can be described as a well-defined problem space, where you have different tools at your disposal for solving problems. The problems are well balanced with clear feedback and reward systems to keep the learner engaged. In a game the player have the control – what he/she does have consequences and are important for how the experience progress.

An example is SimCity where you play the mayor that needs to build up a city. You basically learn about urban planning. The problem space is the city layout, where you have a number of tools at your disposals. As you try to find ways to make good urban planning with different tools you are learning about area.

Even though the above elements may not be alien to elearning they benefit from being thought of as a whole. In elearning the main driver is ‘learning’, whereas in games it is ‘winning’ the game (=mastering a problem). This shift in emphasis provides a number of advantages for creating more engaging and motivating experience driven by game mechanics and storyline. However, it also hints at some of pitfalls embedded in serious games. When developing serious games you need to be sensitive to two common problems: integration and focus.

Games are extremely powerful and players’ will spend all energy on winning. You have to be very careful that the serious game is developed with this in mind. Basically, the storyline, mechanics and learning goals needs to carefully aligned. To win the game you need to master the learning. Several studies show that without an eye on these challenges players will learn to play the game (but not necessary much else). From this also follows that before embarking on developing a serious game you need to make sure that the subject matter is possible to match with the learning objectives you want to address.

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5 For an extended explanation of these problems see Egenfeldt-Nielsen (2010). What Makes a Good Learning Games. Under publication.
Furthermore, studies show that making the learning experience in the game explicit through feedback, debriefing and explanations increase learning results.\(^6\)

Another crucial element in terms of learning is how assessment is handled. In games you usually have tracking mechanics during the game that work as assessment (assuming learning and game goals have been aligned appropriately as described above). However, often you also implement classic assessment tools (multiple-choice-tests) to make it possible to measure results against more traditional e-learning applications.

**Serious Games - A full learning experience**

Serious games should not be seen as a standalone experience but optimally in interplay with other teaching tools. The serious games field has an even clearer rejection (than the e-learning industry) of the fallacy that an instructor can easily be replaced. The instructor is crucial for ensuring reflection and guidance during the learning experience. Obviously, you will still learn without an instructor, but you risk loosing focus and effectiveness, as you can’t replace the sensitiveness a good instructor can apply to progress learners.

To better understand, where serious games have their natural strengths a look at a modified version of Kolb’s learning cycle is helpful. Optimally, a learner will travel through the learning cycle constantly while learning. While all learning modes hold elements of all modes some activities will lend themselves more easily to other.

Games are especially strong at creating a shared space where you can experiment with ideas, theory and knowledge. This experimentation will result in feedback from the system in form of concrete experience that can then be reflected on and ultimately extended beyond themselves as abstract concepts. From this also follow that for instructional purposes you will need

to focus on extending the reflection, observation and building of abstract concepts that is transferable beyond the immediate situation. This is the role that debriefing and explanatory feedback aims at solving. However, you can also use collaborative learning among peers driven by the game and/or include an instructor as part of the experience.

**Structure of a serious game**

The structure of serious game depends on what types of game (genre) you are making. Also, you should not randomly choose a genre. Rather you should consider your learning goals and map those to the game genre. Furthermore, you should be sensitive to time. The below can are often combined although it will usually increase the budgets as you basically have to make two different games that also work together.

**Adventure game**

**Learning goals:** Adventure games have a strong narrative component that is useful for communicating information suitable for text. Adventure games usually have a number of small mini-games that are embedded in the progressing story that can be small puzzles, quizzes or similar.

The adventure format provides a good flexibility by both having the narrative to use as learning carrier and choosing the most suitable mini-games for a given learning objective. Adventure games are the most commonly used format for most corporate serious games.

**Structure**

- Background story – the game universe, the challenges you face and the role you play are introduced.
- Task description w. learning goal – a specific task you need to solve
- Mini-game – quiz, puzzle, mind-game, dilemma
- Story progression
- Assessment – a type of test
- Debriefing – a summary of how well you did overall.

**Strategy game**

**Learning goals:** Strategy games are basically advanced systems that you have to understand by interacting with them. You are posed different challenges that you must solve by understanding how the system work, and what happens when you influence it in different ways. As such, strategy games have the most complex game mechanics.
They are especially useful for learning more complex interaction between different agents and variables. Strategy games have been used too a limited extent despite there huge potential. Probably because they require a close relationship between subject matter experts and developers to build a robust underlying system that players interact with.

Structure
- Background story
- Task description & goal(s)
- Assessment – a type of test
- Debriefing – a summary of how well you did overall.

Action game

Learning goals: Action games are well suited for skills training related to eye-hands, coordination, visual perception and similar general cognitive skills. You can complement the experience with other learning goals, but they will quickly be more extrinsic to the experience, which reduces learning efficiency.

Action games are usually mostly used for very domain specific, repetitive and focused learning goals for example training surgery or marksmanship.

Structure
- Background story – the game universe, the challenges you face and the role you play are introduced.
- Task description w. learning goal – a specific task you need to solve
- Main game – the action game where you re-use the same basic mechanic to solve a task but with increasing difficulty.
- Task feedback – feedback on how well you solved the task
- Assessment – a type of test
- Debriefing – a summary of how well you did overall.

Cost

Serious games are usually thought to be more expensive than traditional e-learning application. However, the exact price depends very much on technology, scope, variations and game genre.

If we compare serious games with existing average industry prices for e-learning the difference is not significant. Generally speaking 1 hour of e-learning with multimedia will cost $65.000, whereas a more traditional e-learning application will cost $35.000.
There is no established industry standard for serious games that vary even more than e-learning applications. Yet it is definitely possible to make a serious game that will have the advantaged associated with serious games described earlier for $35,000-$65,000. However, the visual high quality 3D serious games are somewhat more expensive than $65,000, and very much depend on the exact visual design that is usually more than 50% of the development cost.

Conclusion

Serious games holds a great potential that increasingly is being recognized in very diverse industries. Serious games approach learning as a challenging, engaging, difficult and rewarding experience that can be enriched by drawing on the principles developed in the games industry the last 40 years with great success.

Today a number of the biggest organizations and companies in the world including Amnesty International, Unicef, KPMG, Shell, Hewlett-Packard and United Nations use serious games for various purposes.