Effective Learning Through Meaning Construction in Digital Role Playing Games

Klaus P. Jantke
Fraunhofer Institute for Digital Media Technology
Erich-Kästner-Straße 1a
90904 Erfurt, Germany
Email: klaus.jantke@idmt.fraunhofer.de

Tim Hume
Universal Learning Games
Framtidsvägen 12A
352 57 Växjö, Sweden
Email: tim.hume@ulearngames.com

Abstract—Game-based learning (GBL) is promising, almost as promising as learning when sleeping. But why does it work? And how to implement it? For which purpose is it appropriate? And when is GBL doomed to fail? Serious games design is an art. How can game designers and developers utilize deep and well-established results of the humanities to make the design and implementation of digital games for learning a routine process? The understanding of digital role-playing based on theories of social psychology such as symbolic interactionism leads to the authors’ original generic approach to game-based learning design. A serious game has already been designed, implemented, and evaluated for language learning that runs on conventional computers, as well as on varying mobile devices such as tablets. The stage is set for a series of similar role-playing games which allow for learning in largely varying domains.

Keywords—Game-based learning, role playing, game design.

I. PROS AND CONS OF GAME-BASED LEARNING

According to Prensky [24], it is done. Learning by means of digital games is well-established, at least in the industries, for already more than a decade. Some of the authors’ own observations [14] contradict Prensky’s gushy description of the practice of game-based learning (GBL). Egenfeldt-Nielsen [7] proves Prensky wrong: “Edutainment started as a serious attempt to create computer games that taught children different subjects. Arguably, it ended up as a caricature of computer games and a reactionary use of learning theory.” (ibid., p. 42)

Apparentely, some authors believe that what humans do in competition establishes a game or, in other terms, to compete means to play [22]. Similarly, some believe that to collaborate means to play (ibid.). In this way, we are getting many games that have an educational purpose, but are not much fun to play.

One of the key problems with so-called serious games [26] is that playing and learning literally fall apart [13]. It takes enormous efforts to seamlessly integrate learning and playing and it requires some appropriate technology to systematically wrap educational theory into game play [19].

The crux is that players can only learn—or even train—what they are really doing. Consequently, there is an urgent need to better understand and respect the relation between the real and the virtual [16].

In the training game TRAST [1], just for illustration, human players really make decisions and choose measures of disaster management which have a real impact on how the disaster evolves. The disaster is virtual, but the decisions are real.
Richard Bartle, one of the fathers in spirit of Dungeons and Dragons, said that “at the persona level of immersion, the virtual world is just another place you might visit, like Sydney or Rome. Your Avatar is simply the clothing you wear when you go there. There is no more vehicle, no separate character, it’s just you, in the world.” (cited after [32]). But what is real?

Whatever humans encounter, they have an ability to give meaning to “the senseless infinity of world affairs” as Weber put it ([33], p. 180). This point of view resulted later in what is nowadays called symbolic interactionism (see [25] and [17], in general, [8], [30], and others, in detail, as well as [20] and [5], for the roots including the term itself). For example, humans are used to giving some meaning to gestures and face expressions. This is known as body language 2.

According to the theory of symbolic interactionism (see [25] and [17] which are both excellent sources), one might say—perhaps a bit exaggerated—that a story evolving through game play is not in the game, but is constructed by the player. Storytelling as story generation even within some cultural or sociological context is studied by Fries where the scientific perspective evolves from [9] to [10]. When humans play, there occur emotional and cognitive processes of meaning construction. This unavoidably diversifies the way in which humans learn through game play.

In response to suchlike essential difficulties of GBL, the authors have developed an approach in which emphasis is put on role-playing characteristics within digital storytelling. Before summarizing the approach in section III and demonstrating an application in section IV, it is necessary to discuss the essentials of digital role-playing seen from the perspective of its subsequent use.

In a digital role-playing game, you play a virtual character—not a plastic token, not a ninepin, not a chessman, . . . in some virtual world. The characteristics of this virtual world must allow for assigning meaning to places, actors, and actions (according to symbolic interactionism) such that it’s just you, in the world (according to Bartle, see above). There are challenges to be mastered. For this purpose, you need to develop your character—the virtual one in the virtual world.

Characters in role-playing games have properties named attribute, skill, and the like 3. From a very formal point of view, those are variables. The variables have initial values which depend on certain player’s prior choices such as race or clan. Skills may be developed, i.e. the variables’ values can be increased by appropriate game play. The player’s character may gain strength or more sophisticated witchery, for instance.

Apparently, many of the character skills are only virtual. Even in case you experience that it’s just you, in the world, it does not buy you anything in real life, if you developed your witchery drastically.

II. DIGITAL ROLE-PLAYING GAMES FOR LEARNING

Recall that GBL requires human learners, even in virtual worlds, to do real things [16]. The crux of the authors’ approach is, very roughly speaking, to make the knowledge and the skills to be acquired variables of the role-playing system’s character model (see figure 3 for some prototypical implementation in the digital game THE ELDER SCROLLS: SKYRIM).

Just for illustration, let us consider two rather different examples, one from higher mathematics and another one from language learning.

It is known that there is no universal approach to solving arbitrary ordinary differential equations; there is not anything such as a closed theory, but a huge collection of largely varying methods [23]. Those methods are related in an intriguing way, as certain types of differential equations are subtypes of others. For those methods covered by a digital game for learning, make the ability to use the method a skill (like mysticism and alchemy, e.g., are skills in THE ELDER SCROLLS: OBLIVION). Within game play, solving equations must play a role for reaching goals that make sense and are attractive to the player. The players may need to shoot dragons or to beat zombies, actions that are definitely virtual. But solving any differential equation is a real activity. Solving some equation of a certain type results in increasing the character’s related skill, i.e., increasing the variable’s score 4.

If you want your learners to develop language skills such as, e.g., showing disbelief or giving an opinion, make those real skills a component of a virtual character’s skill profile in a digital role-playing game. If it is necessary for progress of game play to express some disbelief in appropriate words, human players have a real opportunity to practice and learn, even if they need to talk to an ork or to an elf. Apparently, orks and elves are virtual, but the player’s speech act is real.

To motivate the human players to engage in knowledge and skill acquisition, some appropriate game design is necessary. Beyond the motivation which is an inevitable prerequisite of successful learning, the game mechanics must guarantee repeated opportunities of character development throughout game play. Key issues are

- character profiles that contain for each learning goal at least one variable,
- a game story in which the players are likely to give sense to their virtual character’s skill variables,
- a game mechanics which determines the relevance of character development to progress in game play,
- sufficiently many and repeatedly occurring opportunities of game play suitable for deliberately developing character skills,
- effective in-game functionalities for the visualization and inspection of the virtual character’s skill profile to allow for player/learner-centered skill development.

Current patterns of game design [4] do not yet consider the above requirements.

4 Developing one skill may have impact on another skill as well, if those skills are related. If you solve some Bernoulli equation, this increases not only your Bernoulli skill, but—a bit, at least—your Riccati score as well, because Bernoulli equations are a special case of Riccati equations. This, however, goes beyond the limits of the present paper.

2 The cultural dependence of meaning assigned to expressions of body language is definitely interesting and relevant to digital games, because it helps to understand why and how games may be perceived differently in different regions of the world. But this issue is beyond the limits of the present paper.

3 In THE ELDER SCROLLS: OBLIVION, there are 8 attributes and 21 skills such as, e.g., acrobatics, alchemy, athletics, mysticism, sneak, and speechcraft. In the THE ELDER SCROLLS: SKYRIM, there do exist 18 skills in 4 groups. There is no way to provide anything like a survey of character concepts in role-playing games.
IV. THE MINNITS – HOW TO DO THINGS WITH WORDS

J. L. Austin’s insight that we can “do things with words”[2] is not only of philosophical and sociological relevance. It is inspiring to teaching languages, because it leads to language learning by doing. This perfectly fits the authors’ approach to learning by means of digital role-playing games in which learners practice the real skills targeted in the virtual world.

THE ENGLISH MINNITS is a digital role-playing game in which the human player’s avatar—recall Richard Bartle’s saying: it’s just you, in the world—is characterized by a large collection of skills. Some as on display in fig. 2 are relevant to fighting dragons, whereas others on display in figs. 1 and 3 are relevant to doing things with words.

The skill categories are interwoven by the game mechanics. By means of developing language skills, players score points which may be invested into advancing skills of importance to fighting such as, e.g., the resistance to dragon attacks and the firing range of the player’s weapon.

Consequently, even those players who are more interested in the virtual game world with its dragon fights than in language learning have a strong motivation to improve their real language skills (named “Functions” as shown in fig. 3).

Role-playing means to act in a virtual world and to improve the own character’s relevant skills. As briefly sketched in section III above, there may be both virtual and real skills. The art of developing role playing games for language learning is to make the focused language skills relevant in the virtual world and attractive to human players. This requires an appropriate storytelling and its implementation in some game mechanics.

Whether or not the game mechanics results in fascinating game play is largely independent of real learning skills in focus. It is an independent art to design good games. And because it is an art, there does not exist any recipe which guarantees success.

For role-playing games, it is important to give some freedom of choice to the player concerning the way in which the character shall be developed. Figure 3 shows two subsequent screenshots of the player’s skill profile. Every skill listed describes some real human ability of executing language acts in English.

Figure 3 shows two subsequent screenshots of the player’s skill profile. Every skill listed describes some real human ability of executing language acts in English.

The player’s skill profile on the left is a very early one. There is not yet any achievement in the ability to start a conversation. When players interact in the virtual world, they are able to improve their real language skills. The screenshot on the right taken slightly later shows first achievements in starting a conversation as well as some more substantial progress in meeting people.

5 In THE ENGLISH MINNITS, this freedom of choice is still rather limited. It seemed to be more important to come up with a first fully working implementation than trying out a larger number of variants suggested by theoretical investigations.
V. SUMMARY & CONCLUSIONS

The English MinNITs introduced in this contribution’s preceding section is just a first instance of the huge category of educational role-playing games according to the authors’ novel approach laid out. This paper is not about a particular game, but about the principles underlying a whole category of digital games suitable for learning through real character development in a virtual world.

The evaluation of the game’s acceptance and impact is necessarily beyond the limits of this first paper in its field. Nevertheless, there are some facts to be reported. The game has been trialled in schools in the Czech Republic, Germany and Sweden. About 500 school children took part in the trial. The feedback from the children and their teachers has ranged from positive to enthusiastic.

Some systematic evaluation has to follow and will be reported separately.

VI. ACKNOWLEDGMENT

Sigma Ukraine together with Sigma Technology was involved from the start in creating THE ENGLISH MINNITs. Using the game engine Unity 3D, Sigma helped ULG to come up with the viable concept, design, develop and produce the product.

It was one of their former employees—Yuriy Brovko—who now works for Fraunhofer IDMT who was responsible for establishing the working contact and co-operation between the two partners. For this Yuriy is to be warmly thanked.

References


