

## Chapter 12

# Serious Games as an Instrument of Non-Formal Learning: A Review of Web-Based Learning Experiences on the Issue of Renewable Energy

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### ABSTRACT

*This chapter contains a systematic overview of various didactic designs, which are used to provide learning experiences via the Internet. Using the example of renewable energy, the development and status quo of Web-didactic offers is reconstructed on the basis of concrete cases ranging from simple replication of classical teaching materials to different kinds of serious games. This bottom-up approach provides a practical introduction on how to evaluate serious games or other digital learning offers by identifying the most essential criteria for a didactic game analysis, but can also be used for benchmarking as some of the examples might also be inspiring for actual game design. Furthermore, this review indicates a significant gap between the high didactic standards for designing self-administrated learning environments and the factual realization as it is shown in most of the examined cases. A basic understanding of the requirements of different learning settings is given in the introduction.*

### INTRODUCTION

From a didactic point of view, games are an interesting phenomenon: In general, games are very popular because needs of affection, attention and recognition may be fulfilled as well as needs for prestige, strength, achievement, independence or

freedom (cp. Maslow, 1943). Because of the high intrinsic motivation of the gamers to meet these needs, gaming becomes an end in itself with the single purpose of performing the playing activity.

Although learning processes are usually neither intended nor reflected by the gamers, a major part of cognitive, motoric, and social development

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takes part within the context of games. The easiness of acquiring knowledge, skills, or cognition while playing arouses interest in using this kind of learning for different intentions. In this case, games are designed or transformed in such a way that they pursue at least one further purpose other than the pure pleasure of the game as specified by the initiator of the respective game. Games become more serious because they now take on functions which are perceived to be relevant beyond the borders of the game.

The player's motivating force – the pursuit of satisfaction – does not become less important but is in fact exploited in terms of the additional purpose because the motivated engagement in the game represents the prior condition for imparting transferable knowledge. On the other hand, it is this very exploitation which may adversely affect the motivation of the player because it is precisely the stepping out of “real” life which constitutes the game situation (Huizinga, 1950, p. 35f).

Each attempt to influence the gamer from outside the game causes a serious intervention into the games world and runs the risk of reducing the gaming pleasure of the players. Nevertheless, gamers may accept non-game-related purposes under the following conditions:

1. The gamer does not recognize the manipulation and appreciates just the game itself (Ignorance).
2. The gamer recognizes the manipulation but rates the (expected) satisfaction by the game higher than the possibility of being affected adversely (tolerance).
3. The gamer recognizes the purposes of the game provider and endorses his intention in principle or trusts his reputation (acceptance).
4. The aims of the gamer correspond with the intention of the game provider (agreement).
5. The game setting is integrated within an institutionalized context and – at least in part – is extrinsically motivated (commitment).

In case of the behavioral patterns ignorance, tolerance and acceptance, the gamer's interest is focused on the game itself, while learning processes occur, at best, incidentally.

According to Kirchhöfer (2002) Incidental Learning is neither goal-oriented nor reflected, but arises simultaneously to another performed activity which means that Incidental Learning is always situational and linked to a certain problem. Typical examples from the area of Serious Games are Advergames, Recruitment Games, but also some News Games, Games for Change or Games from the genre of Edutainment or Infotainment.

In contrast, there are also a number of Serious Games, which are used by the gamer with the intention of learning, training, acquiring or creating something, that endure beyond the game. Relating to learning aspects, this means that being engaged in the game requires inherent time for learning processes which might be either self-organized (4) or externally-organized (5). In this case, gaming describes just one among many other methods to deal with the learning content.

Kirchhöfer (2003, p. 32) differentiates goal-orientated learning between (4) Informal and (5) Formal Learning. However, he defines Formal Learning not categorically as learning in formal educational institutions, like Dohmen (2001), Livingstone (2001) or the EC (2001, p. 33ff), but rather qualitative through characteristics such as external structure, curricular learning targets and independence from a specific problems. Accordingly, Informal Learning is marked by its own problem-oriented construction of learning targets and a self-determined learning rhythm.

According to Kirchhöfer's definition, the differentiation between Formal and Informal Learning is not always clear cut due to the relative reference, but it is always focused on the learner, which makes his approach most suitable for didactic considerations - especially in cases of Non-Formal Learning. While games for Informal or Incidental Learning purposes can be easily integrated into Formal Learning contexts, games

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