Chapter 10
Web–Based Instruction Revolutionizes Environmental Systems Analysis

Gilbert Ahamer
Graz University, Austria

ABSTRACT

For university teaching in general, and specifically for the transdisciplinary curriculum of "Environmental Systems Analysis", web-based learning procedures provide excellent opportunities for socially induced understanding and consensus building. This chapter describes how the social processes emerging in a five-level web-based negotiation game may be conceived in such a way that these form a sequence of growing and decaying intensity in various modes of social interaction. Similarly to individual learning in a classroom, a procedure could be applied to collective learning, namely to social procedures among humans who are starting to create institutional networks for combating global climate change – one of the most urgent tasks at present. A coordinate system of the four main social archetypes of action, namely "information", "team", "debate", "integration" is symbolically called soprano, alto, tenor and bass; these four basic dimensions of social action tend to peak one after the other along a suitably designed gaming procedure.

1. INTRODUCTION: THE MOTIVATION

The objective of this paper is how to understand, *visualize* and model human *social* and especially *gaming behavior*. Findings could be applied also to climate protection which is understood as a long-term collective global learning procedure.

Such a modeling strategy, namely to view the *gaming* aspect (Ahamer, 2013a; 2012b; 2016a, b, c) of life and of learning, seeks to improve game based learning *design*, while it is also used for gaming as such, e.g. for multi-agent systems (MAS) as common to online games.

The motivation of this paper is to understand and visualize important traits of both e-learning and online gaming, more specifically how *fundamental dimensions* of social behavior are intertwined, interdependent and interacting.

For the purpose of studying real behavior of humans, this paper uses the case of a web-supported university lecture structured along the role-game "*Surfing Global Change*" (SGC) that was designed, implemented and copyrighted by the author earlier (Ahamer, 2004a; 2004b; 2005; 2006) and might offer some generalized insights for game developers. Some readers might wish to apply the findings later on also to multi-agent system research (Dignum et al., 2009) as well as to situations similar to the ones occurring in MMOGs (Massively Multiplayer Online Games). Typically, multi-agent platforms assume autonomy of the agents (Baumgarten et al., 2009), similar to students who also behave autonomously in a classroom lecture during game-based learning. In MAS, the communication facilities play a crucial role (Dignum et al., 2009, p. 3).

According to earlier experience, important *criteria for successful learning* and gaming can be (1) self-adaptivity of (learning and gaming) processes, (2) suitable fluctuation of framework conditions and (3) the underdetermined (learning and gaming) paths along which participants move through the "space of possibilities and options". The above quality criteria will be briefly discussed below and add to the three characteristics that make learning fun cited by Wang & Wu (2009), taken from Malone (1980), namely (i) an appropriate level of challenge, (ii) using imagination and abstractions and (iii) tickling the player's curiosity. A classical in-depth book in the field is Mark Prensky's (2001) "Digital Game-Based Learning", which is still worth reading.

1. The quality criterion of *self-adaptivity* means that the level of difficulty of the gaming procedure adapts itself automatically according to the profile of the participant. SGC chooses to achieve this goal by means of a structured dialogue between the participants that causes the level of difficulty and degree of differentiation to converge (through the procedure of conversation) to a level suitable for all participants. Dignum et al. (2009) stated that "the gaming industry has been challenged recently (…) by a realistic cognitive behavior of the characters and realistic reaction and interaction with other characters over extended episodes. (…) We need more cognitive believable behavior of the characters. (…) In MAS, *communication* is one of the pillars of the whole system."

2. The "science of design" (mostly promoted by the "Journal of Design Research" and "Design Studies") posits a *toggling between "problem space" and "solution space"* in which actors would move (Cross, 2011, p. 129; 2007, p. 80). Both learners and gamers encounter such an experience as do soccer players who generate new framework conditions on the field for the other players as a result of their own moves. In order to meet quality criteria for gaming design, a suitable path and a suitable rhythm for such fluctuating framework conditions should be provided by a (learning or gaming) environment. In MAS, one gamer typically provides the framework conditions for the other by his or her own moves, and vice versa.

3. As expressed in design science, the participants move along principally *underdetermined* (learning and gaming) paths through the "space of possibilities and options". Such *constructability* provides more degrees of freedom and more right for creativity than habitually in scientific technological environments where "truth" is rather pre-fixed and only *discoverable*. Lindley & Sennersten (2008) say that "players eventually learn sufficient patterns of interaction to make progress. Game play is therefore fundamentally a process of players learning, adapting and improving play skills."

Hence, mutual adaptation of players' behavior – along the "sense-model-evaluate-plan-act" sequence (Lindley & Sennersten, 2008, p. 2) – is the core of gaming and also of SGC, only on the highly complex level of mutual acceptance of societal rewards (somehow similar to academic peer reviews in scientific

Related Content

E-Learning System's Acceptance: A Comparative Study
Emad Abu-Shanab (2014). *International Journal of Web-Based Learning and Teaching Technologies (pp. 1-13).*
www.irma-international.org/article/e-learning-systems-acceptance/120732

Peer-to-Peer Networks as Extensions of Web-Based Education - Handhelds in Support of Coordination and Autonomy
Malu Roldan (2003). *Web-Based Education: Learning from Experience (pp. 105-119).*
www.irma-international.org/chapter/peer-peer-networks-extensions-web/31297

Electronic Portfolios in Teacher Education : Practical Reflections and Insights from a Systemic Implementation
Howard Coleman, Jeremy Dickersonand Dennis Kubasko (2010). *Technology Leadership in Teacher Education: Integrated Solutions and Experiences (pp. 196-213).*
www.irma-international.org/chapter/electronic-portfolios-teacher-education/44362

Application of Multimedia Simulation Teaching in Youth Physical Fitness Training
Huiying Daiand So Hee Yoon (2024). *International Journal of Web-Based Learning and Teaching Technologies (pp. 1-14).*
www.irma-international.org/article/application-of-multimedia-simulation-teaching-in-youth-physical-fitness-training/338321

Blog Phenomenology: Student Teachers' Views of Learning to Teach Economics
Micheal M. van Wyk (2018). *International Journal of Web-Based Learning and Teaching Technologies (pp. 62-77).*
www.irma-international.org/article/blog-phenomenology/198377