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Links Between Experiential Learning and Simulation & Gaming

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1. Introduction

Knowledge grows. Like vegetables in the gardens it needs favourable conditions and the time to grow. Which are the conditions for learning to occur optimally and how do learning processes really occur? In the field of experiential learning, the crucial importance of direct experience for any learning to occur is highlighted.

This paper aims at linking the field of experiential learning to the field of simulation and gaming. This will help to understand the learning processes that take place in simulation and gaming. Further, it may help to communicate the particular strength of the simulation and gaming method to potential and actual users.

This paper has two parts. First, the Lewinian cycle of experiential learning and its relation to simulation and gaming is presented. Second, Piaget's model of cognitive dissonance is presented and applied to events that frequently occur during simulation games.

2. Lewinian cycle of experiential learning

In experiential learning, the importance of direct experience for learning processes to occur is highlighted. Dewey (1938), for instance, argued that all genuine education comes from experience. The method of simulation and gaming also relies on direct experience, mediated through simulation games. Hence, it belongs to experiential learning as was outlined by Warner Weil & McGill (1989, p. 31). According to Kolb (1984) learning is favoured when four steps are followed (Figure 1):

1 Concrete experience, obtained either through real life or in a virtual environment.

2 Reflective observation: After the experience, a phase of reflection follows. The experience is recreated internally in the minds of the participants and its many facets become apparent under different perspectives.

3 Abstract conceptualisation: In this step, the experience is compared to existing theories and examined for structures, patterns and meanings. In this way abstract concepts and new knowledge are created. Note that knowledge is created at two steps within the cycle: here, and in *concrete experience* (for an in-depth discussion of the double knowledge theory refer to Kolb, 1984). Knowledge from concrete experience stems from an external event, whereas knowledge created by abstract conceptualisation emerges as a consequence of an inner cognitive process.

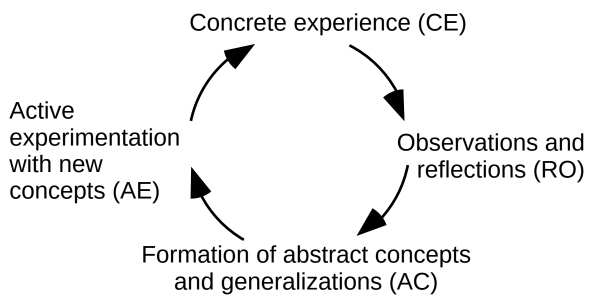

Figure 1: The Lewinian cycle of experiential learning (Kolb, 1984).

4 Active experimentation: The new concepts lead to new strategies for coping with the reality. New experiments are performed consciously to test the new knowledge in real situations. This leads, again, to new experiences that continue the circle on a higher level of understanding.

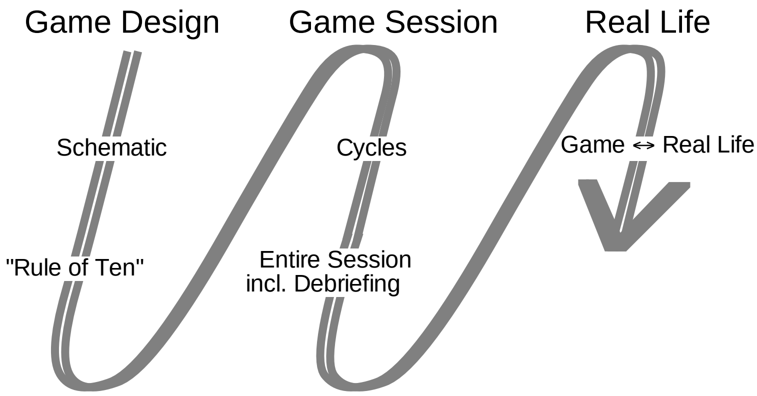

Figure 2: Elements of simulation and gaming related to the Lewinian cycle of experiential learning. Further details given in the text.

These elements of the experiential learning model by Lenin and Kolb are very much present in the method of simulation and gaming (Figure 2):

Game design, schematic: According to the design method employed by Duke (1980) and others, a schematic of the system under consideration is prepared first. This schematic captures all the relevant elements of the system addressed, their interrelations, and the multitude of perspectives present. Formats of schematics vary widely, ranging from rather technical to artistic representations (Geurts, 1997). Such schematics are excellent communication tools fostering a clear understanding during the design phase of the simulation game. The relation to the Lewinian cycle of experiential learning is given in Table 1.

	Concrete experience (CE)	Reflective observation (RO)	Abstract Conceptualisation (AC)	Active Experimentation (AE)
Simulation game development: Design of schematic	The schematic depicts the system for which the simulation game is designed. It is shown to various key persons with different perspectives. The schematic usually provokes pronounced feedback on flaws in the perception of the system.	Game designers evaluate the feedback of the interviewees and adjust their understanding of the system.	Game designers condense the findings into an enhanced description of the system. During this process, a complete new representation of the system of interest may evolve. (For an excellent example refer to Sterman (1994), Fig. 4).	A modified version of the schematic is developed and presented to the same key persons, thus closing the cycle. The cycle is repeated as many times as necessary.
Simulation game development: "Rule of 10"	The prototype of a simulation game is tested in a test run with selected people.	The outcome of the test run is carefully evaluated.	Flaws and strengths are identified and concepts to improve the prototype are elaborated.	A new version of the prototype is developed.
Game cycle	Participants experience the consequences of their activities either by the feedback from teammates or from the simulation model.	Participants evaluate during brief meeting their actions, strategies, and decisions in the last cycle. This usually occurs at the last step within a game cycle.	Participants gain an understanding of what had happened and elaborate new strategies.	Experimentation with new ways of decision-making etc. in the following cycle.
Entire simulation game activity	Simulation game session (the participants immersed in the game activity).	Debriefing part I (venting): Participants describe their feelings and experiences during the run.	Debriefing part II (substantial debrief): Participants evaluate the significance of the experiences within a wider context and with respect to theories and to real life.	Application of the insights and gathered knowledge in real life.

Table 1: The Lewinian cycle of experiential learning as it relates to selected procedures applied in simulation and gaming.

Rule of ten: According to Duke (1980) and Meadows (cited in de Vries et al., 1993), the prototype of a new game should be tested at least ten times. This again results in multiple rounds through the Lewinian cycle, as outlined in Table 1.

Game cycle: Usually several game cycles are repeated during a simulation game. Typically, a cycle starts with a new situation or so called „event cards“ presented to the participants. It progresses with participant interactions, decision making, and ends with a period of analysis. This exactly corresponds to repeatedly walking through the Lewinian cycle of experiential learning (Table 1).

Simulation game session: Table 1 illustrates how the entire simulation game session with preparatory introduction, the proper simulation game, and the debriefing (evaluation) follows the steps of the Lewinian model. At this point, it becomes clear, that proper game design and thoughtful facilitation is required for this type of experiential learning. If debriefing, i.e. the step of reflective observation, or abstract conceptualisation, is shortened due to „lack of time“, learning opportunities inherent in the experiential activity may be irretrievably lost. The Lewinian model explains why a well conducted simulation game session always includes a significant debriefing part.

Simulation game and real life: Participants experience the Lewinian model of experiential learning in a simulation game. Later, they may apply this learning model in the real life, thus propagating this mode of learning beyond the simulation game activity.

3. Piaget's model of cognitive dissonance

How does knowledge grow? This was one of the leading questions in the work of the Swiss psychologist and sociologist Jean Piaget (1896-1980). In extensive studies with children he and his co-workers disclosed how the mind gradually evolves as a consequence of an ongoing interaction of the child with his or her environment. Intellectual capacities gradually develop throughout childhood and adolescence and, intelligence is shaped as a result of the ongoing interaction of a person with the environment. We shall focus here on one selected aspect: the model of cognitive dissonance (see for instance Gredler, 1992).

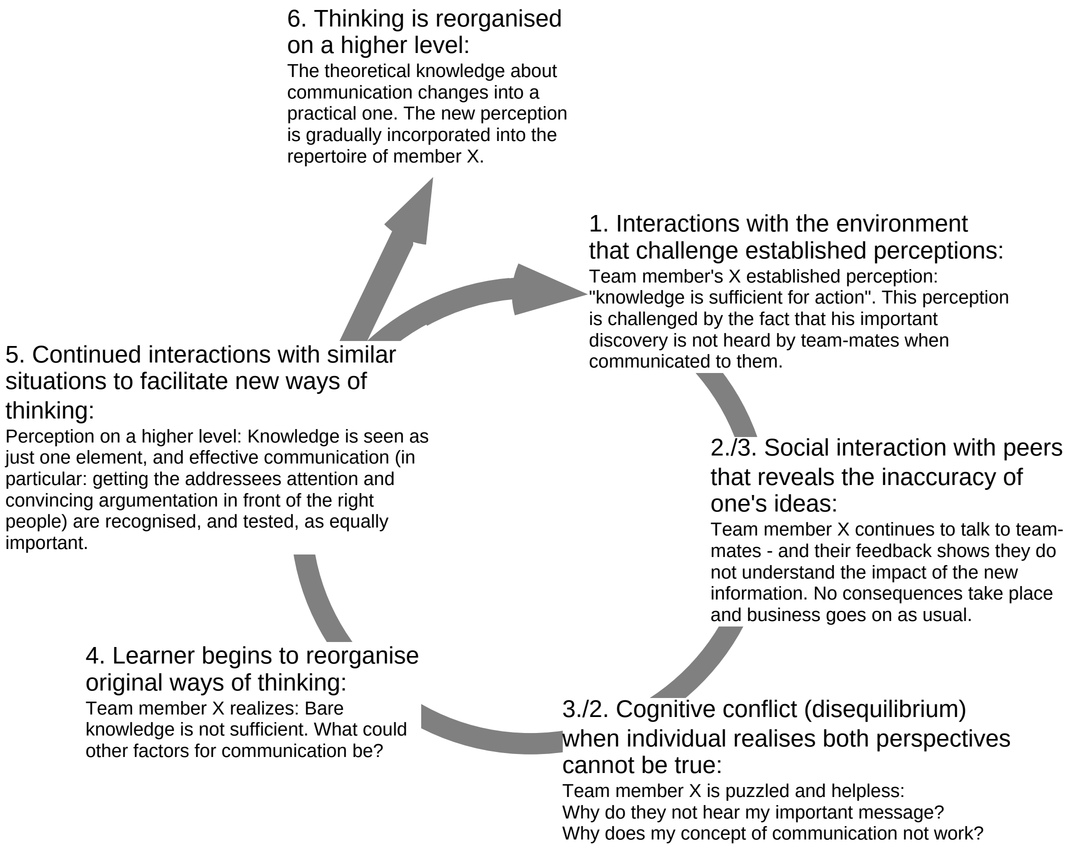

Figure 3: Piaget's model of cognitive dissonance applied to simulation and gaming. The example given for team member X is further described in the text. Modified after Gredler, 1992, with permission.

This model (Figure 3) explains how perceptions of the reality continuously evolve in a cyclical ongoing process. Mind maps, inner representations of outer reality, are not fixed entities, but they are subject to a continuous process of development. Established perceptions (Figure 3) are challenged by interactions with the environment. If such challenges are strong enough, e.g. because accepted peers confirm the deficiencies of one's perception, an inner conflict results. The energy of that inner conflict may be high. As a consequence, old perceptions are questioned and subsequently reorganised on a higher level. Evidence shows that such challenges occur frequently during simulation games, as will be illustrated by the following typical example.

In the simulation game SLOGAN (1991) the participants run three companies that compete in one common market. Each of the companies is divided into four departments, i. e. research, development, manufacturing, and management. Each of the four departments has a specific task related to the slogans that are physically produced from individual characters. *Research* provides the raw material, i. e. the characters, from the resource broker. *Development* produces words from individual characters. *Manufacturing* composes the words to the slogans. *Management* is responsible for organising the departments, and for effective communication of the changing demands of the market.

Illustrative example (see also Figure 3): All members of Silver Inc., one of the companies in SLOGAN, were busy with cutting and gluing, arranging characters to words, and words to slogans. At this point, one of the members of the research team made a discovery important for the prosperity of the entire company. He had identified those characters that can be provided with high reliability. The team member was excited, as he had found the key to the success of the company. His *established perception* (see Figure 3) was: „The most important is knowledge. All consequences will follow by itself.“ However, nobody listened to his findings. He experienced that bare knowledge is useless. The discoverer's established perception was heavily challenged: he experienced that his bare knowledge was useless. If asked in a calm situation, the participant mentioned would have acknowledged that knowledge alone is not sufficient for action. However, the simulation game with its high action level disclosed his deeper perceptions, his actions were based upon and made them accessible to change.

This example illustrates how established perceptions are challenged during simulation games. The following factors explain why it is more frequent in simulation games:

- Short feedback time: cause-effect relations become quickly apparent, resulting in a direct challenge of the established perceptions
- Free experimentation in a safe environment constitutes a framework favourable for such challenges.

- The learning situation is abstracted and simplified. In this way, the effect under consideration emerges more lucidly, not messed up with other everyday events.

4. Conclusions

This article examined links between experiential learning, and simulation and gaming by means of two examples, the cycle of experiential learning by Lewin, and Piaget's model of cognitive dissonance. It became evident that the method of simulation & gaming and many phenomena observed in the application of its tools can profit from theoretical models established in experiential learning. This may be fruitful in several ways:

- It leads to a better understanding of what happens exactly during simulation games.
- Knowledge of models like the one discussed on cognitive dissonance may help to design simulation games more efficiently to trigger events as reported for SLOGAN.
- It supports to communicate the power of the simulation & gaming method to a broader audience, especially to people sceptical about gaming.

A forthcoming article will evaluate the issue in greater depth (Ulrich 1998). There are yet many more fields in experiential learning that are worth being consciously recognised by the community of simulation gamers, e.g. different learner types, different types of knowledge, the theories of creation of knowledge, left and right brain modes of cognition, etc. If this paper triggers further thought and further linking of the these two scientific fields, its intention is fulfilled.

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