Chapter 10
Navigational Paths and Didactical Patterns

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ABSTRACT
This chapter focuses on a specific field of e-learning: the relationship between general didactical patterns to design teaching/learning processes on the one hand and empirical behavioral patterns of users (navigational paths) on the other hand. It is based on empirical research on the usage of a hypertextual on-line learning environment. The analyzed dataset consists of about 1500 paths containing about 4700 pages. These empirical navigational paths are analyzed in order to identify similar paths (patterns, structures and regularities), following a heuristic and inductive approach. This approach is based on the method of sequence analysis (optimal matching). The aggregation of similar paths into homogeneous groups will be discussed, as well as the identification of patterns within these aggregated groups. The inductively identified empirical patterns will be compared to deductive, theory-driven patterns. Empirical results will be presented which show the variety and complexity of empirical navigational paths and their relation to theory-driven patterns. These results will be located and discussed in a pedagogical-didactical context.

NAVIGATIONAL PATHS AND DIDACTICAL PATTERNS

This chapter refers to a specific field of e-learning: the empirical analysis of navigational processes in hypertextual on-line learning environments. As there is no predefined exclusive way to navigate a non-linear hypertext, navigation depends on the choices of every single user. The user is selecting specific links from a multiplicity of possible links (see Iske, 2002). This process of exploratory, self-directed navigation can be described as the linear unfolding of a non-linear hypertext (see Kuhlen, 1991, p. 33).

This linear unfolding will be focused as the relation between the structure of the learning environment on the one hand and the empirical navigational paths on the other hand.
Navigational Paths and Didactical Patterns

In the following the term “pattern” is used in a very general way according to every-day usage as specific regularities, i.e. in the sense of structural regularities of a wall-paper which form a specific “pattern”. It is explicitly not used in the elaborated way proposed by Christopher Alexander (1979) as a method to describe, implement and evaluate design processes. More precisely I will refer to navigational paths (sequences) as behavioral patterns in hypertextual on-line environments, as a specific regularities and structures (see Baur, 2005, “Social Pattern Analysis”), which take into account a fundamental characteristic of acting: temporality.

• On the one hand, these temporal patterns refer to individual learners (“How do learner X acquire the learning environment? Which strategies of acquisition he uses?”).
• On the other hand, on an aggregated level these temporal patterns refer to a group of learners (“How do group X acquire a learning environment? Which strategies of acquisition are used?”).

The consideration of temporal aspects implies a specific perspective on learning: the perspective of the learner and the learning process – and not the perspective of a teacher and teaching processes (or a designer of a learning environment). From this perspective, patterns of usage are the complementary side of the structure of learning environments (which may be for example based on “design-patterns” described by Alexander): the navigational path is brought into focus.

In general, I am acting on the assumption that navigational paths in hypertextual learning environments:

• are not contingent, but contain specific patterns, structures and regularities within the action of learners (behavioral patterns);
• are an index for implicit and explicit strategies of learners. In this respect, navigational paths reflect a specific “habitus” which according to Bourdieu (1993) can be characterized as structured structures predisposed to function as structuring structures;
• refer to a specific context, in this case: to a specific hypertextual learning environment as the context of these navigational strategies.

Therefore, the analytical focus is on general processes of acquisition and not on processes of designing on-line learning environments by means of “design patterns” (see Kohls / Wedekind, 2008). In contrast to Alexander (1979) it can be stated that this approach does not focus on the documentation of “design patterns” but on the empirical interaction with these “design patterns” by real users, i.e. on “navigational patterns”.

The analysis of navigational patterns as usage patterns gain in importance, especially in the context of standardization in e-learning (see IMS Global Learning Consortium) and the identification of “Learning Design Patterns”. According to Koper (2006) this kind of analysis poses a crucial challenge for research: “The idea of learning design patterns and the possibility to recognize them automatically with pattern detection algorithms is a new field of work that is worthwhile to elaborate in future.” (Koper, 2006).

Currently this identification and documentation of patterns is conducted following either a deductive or an inductive approach (vgl. Brouns u.a., 2005): Following the deductive approach, patterns are developed by experts (see ‘Instructional Design’, Reigeluth, 1999), whereas the inductive approach analyses the didactical structure of learning environments or online-courses – in the majority of cases “best-practice-scenarios” - in order to identify and to extract empirically approved solutions for recurrent problems.
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