

## Preface

Learning environments change enormously under the influence of electronic tools and digital media. The equipment in classrooms allows new ways of interactive visualization, knowledge construction, and collaboration. Online tools and social networks offer new ways for communication, sharing of ideas, and learning together. Traditional methods and scenarios are supported by e-learning tools, or they are changed under the influence of new opportunities. Some settings may vanish while new forms emerge. Teachers and educators all over the world try out new things and experiment with innovative forms and scenarios. The variety and the consequences of these changes make it more necessary than ever to document and to exchange these approaches. Patterns are a means to share the best practices by documenting what has worked successfully. Innovation can only multiply if good solutions are preserved and failures are regarded as lessons learned. The very idea of experimenting in this field is to test the new ways one can choose due to the promise of digital media and e-learning. The results of such tests in teaching practice show us new ways to go, which limitations exist, where obstacles have to be cared for, and which areas are dangerous or not fruitful.

Patterns can capture such rich information because they are empirically based on solutions that have worked several times, and they show the scope of application by describing the contexts with their constraints. They are an effective report about proven ways, their boundaries, critical paths and goals. They explicitly name the benefits and costs, and reason for why a specific form is shaped the way it is. Particularly in the field of e-learning, there are a vast number of new ideas, projects, and concepts. In such a situation, teachers and docents need practical support to choose the appropriate tools among the huge range of options. By sharing experience and learning from others, we can re-use good learning designs and avoid making the same mistakes again and again.

E-Learning patterns are a specific branch of pedagogical patterns that take the digital opportunities of today's learning environments into account to improve the learning and communication between students and teachers. Therefore, e-learning patterns address problems and questions at various levels, including the use of tools and media in various educational settings, the design of learning management systems and collaboration tools, and the implementation of e-learning. It is interesting to notice that in the beginning, patterns have been promoted mostly by computer scientists. The first pedagogical patterns have been written to share knowledge about teaching object-oriented programming. Not all patterns have been about teaching computer science, but almost all authors have had a technical background. While the first educational patterns had been about teaching computer topics, the next generation was about using patterns to describe the designs of educational technology, such as learning management or collaboration systems. Computer scientists who were familiar with design patterns found it almost natural to use design patterns in order to specify and communicate about the design of e-learning systems. The

link between design patterns and CSCL scripts that can run on a computer is especially given in the chapter “Linking CSCL script design patterns: connections between assessment and learning patterns”.

There are now many e-learning patterns that have been collected by both practitioners and researchers. What we can see today is that more and more patterns are about the successful use of technology in educational settings; for example online courses, e-assessment, and agile teaching methods. Such scenarios are beneficial for all knowledge domains, and their scope is no longer limited to the interests of computer scientists. Hence, there are now more pattern authors who have a pedagogical rather than a technical background. This is very fortunate for pedagogical and e-learning patterns as well, because those authors bring in their knowledge about learning theories and teaching principles. They use a vocabulary to describe the contexts and forces that is better shared by educators, and they justify the patterns of good practice by explaining them with established models and theories. Indeed, the community is still limited to educators who share an interest in using technology for teaching. But it is most likely that they will promote the pattern approach amongst other teachers because they are such a powerful vehicle for communication.

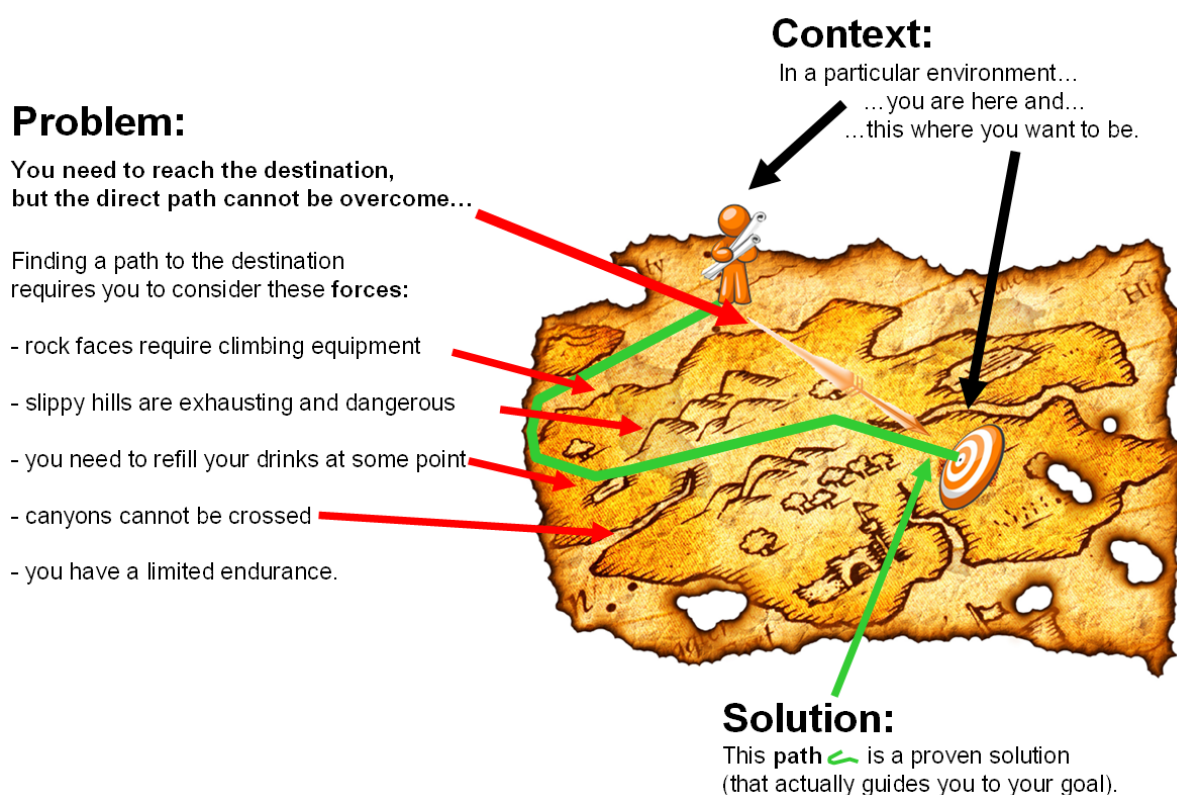
Why is the description of best practices as patterns so appealing and attractive to educators? First of all, patterns describe solutions to recurrent problems and take the environment into account. In a way the environment shapes the solution form—just as a landscape governs which alternative paths are possible to reach a goal. Patterns provide a reason for the ways and methods that are described.

Second, patterns describe solutions on a medium level and bridge between practical implementation and theoretical generalization and reasoning. Many educators are frustrated by too abstract models which provide no instructions about how to actually design learning situations. At the other end of the line are anecdotes and case studies that make it hard to see any general structures in order to transfer and re-use the scenarios. This unsatisfactory level of abstraction is highlighted by many authors of this volume who see patterns as a solution to this challenge, especially in the chapters “Patterns and instructional methods - a practitioners approach”, “Evaluating learning designs through the formal representation of learning patterns”, “Patterns for building patterns communities”, and “A glimpse on the whole”.

However, a mid-level of abstraction still offers a wide range of abstractions, and of course this volume shows that we can find patterns on different levels. The chapter “Video clip quests as an e-learning pattern” describes in detail a specialized version of WebQuests which are described as a pattern example in the chapter: “The essential structure of teaching method descriptions: Is one of the two levels superior?” Both are valid patterns because the VideoWebQuest is a specialization of the WebQuest. What makes both forms a valid pattern is that they are general enough in order to be used in various situations. At the same time, they are specific enough that they can guide a particular implementation. Both forms are meaningful and whole. Wholeness is a concept that is very important to the entire pattern approach. It is discussed from two different views in “Patterns as an analysis framework to document and foster excellent e-learning designs,” and “A first glimpse at the whole.” The latter complains that the pattern community is debating more about description formats than how to achieve wholeness. The first argues that the description format of patterns is designed to cover wholeness.

All in all, how to describe patterns remains an important topic in the pattern community. Various description formats are discussed in “Perspectives on patterns”, “Evaluating learning designs through the formal representation of learning patterns,” and “The essential structure of teaching method descriptions.” The structure of the description governs what is said about the pattern. However, a too detailed description can blur the pedagogical ideas behind the pattern. The reader will find a lot of different description formats in this volume, allowing a comparison of their similarities and differences. An informal

Figure 1. The environment suggests which possible paths can be taken



way to visually represent the structure of an educational pattern is proposed in “Visualizing e-learning processes using Didactic Process Maps”.

Of course, most important are the patterns themselves, and it is remarkable that there are so many examples in this volume. The examples show the various levels of abstractions, the different descriptions and pattern formats, alternatives in mining and applying patterns, and the variety of target audiences, for which the two variations of the WebQuest pattern are just one example. There are also multiple works on e-assessment patterns, exemplified by the chapters “Computer-assisted assessment patterns for different target users: the case of Multimedia Questionnaires” and “Formative e-Assessment: case stories, design patterns and future scenarios.” The latter contains some patterns about giving feedback, as well. In this volume, we will also find ways of giving feedback that follow agile approaches to teaching (chapter: “Towards pedagogical patterns on feedback”), and a pattern that combines various feedback types (chapter: “Didactic design patterns for virtual anonymous and non-anonymous feedback”). The broad range of educational patterns is further illustrated by a pattern that fosters creativity (“Design patterns as guidance for designers of groupware used by team for the development of innovative products”).

But where do patterns come from, and how are they related to what goes on in classrooms or virtual learning environments? A methodology to induce patterns from design narratives of practitioners is provided in “Embedding design patterns in a methodology for a design science of e-learning.” How such patterns can be validated against learning theories is explored in “Evaluating learning designs through the formal representation of learning patterns,” and how patterns can be validated against the

actual behaviour in learning platforms is described in “Navigational paths and didactical patterns.” The chapters “Patterns for social practices: A psychological perspective” and “On the implications of the social Web environment for pedagogical patterns” both tackle the question how patterns are socially constructed. The first one focuses on psychological explanations, whereas the latter describes how patterns are shared in Web 2.0 environments.

This first overview illustrates that e-learning patterns represent a multifaceted approach. In order to give our readers a clear structure, this volume starts in the first section with an introduction to design patterns that will illustrate the concepts with a special focus on e-learning patterns. To get a better understanding of patterns, the second section explores the relations to other approaches, including teaching methods, learning theories, and scripts. Theories and methodologies about patterns are provided in section three. This theoretical background is a good preparation to understand and take a critical view on the pattern examples in section four. Those patterns are not just examples of e-learning patterns, but they exemplify the theoretical ideas and concepts provided in the preceding sections. The last section provides reflections on the pattern approach, discussing challenges and needs for further research.

We hope that the reader will find as many insights to the pattern approach and the actual patterns as we did as we compiled this volume. Most of the present chapters have been discussed in a workshop about e-learning patterns. The workshop was organized by the editors at the Knowledge Media Research Center, Tuebingen, in March 2009. We were in the fortunate position to assemble most qualified exponents of pioneering projects and initiatives. Thus the workshop was a kick-off for much discussion, reflection, and communication about e-learning patterns. The results and multiple perspectives can be found in this volume.

*Christian Kohls*  
*Knowledge Media Research Center, Germany*

*Joachim Wedekind*  
*Knowledge Media Research Center, Germany*