

# Learning Patterns: A Pattern Language for Active Learners

Takashi Iba <sup>\*1\*2</sup>

Toko Miyake <sup>\*3</sup>

Miyuko Naruse <sup>\*2</sup>

Natsumi Yotsumoto <sup>\*3</sup>

## Abstract

In this paper we propose a pattern language for active learners, which we name “Learning Patterns”. Learning patterns were originally developed in order to support learning of university students, however we think it can be applied to any learners in various situations like engineering, business, science, and everyday life due to the abstract descriptions of the pattern language. In this paper, we show the overview of 40 patterns and picked up five patterns in detail. In addition, we shall present that a practical application that we have handed out the catalog of the learning patterns to university students.

## Table of Contents

1. Introduction
  2. Pattern Format
  3. Summary of Learning Patterns
  4. Five Learning Patterns as Examples
  5. Practical Application for University Education
  6. Conclusion
- Acknowledgment
- References

---

<sup>\*1</sup> MIT Center for Collective Intelligence, Massachusetts Institute of Technology

<sup>\*2</sup> Faculty of Policy Management, Keio University

<sup>\*3</sup> Faculty of Environment and Information Studies, Keio University

## 1. Introduction

As it is well known in the scene of education, there is a difficult problem how we can teach students how to learn. It is quite easy to show the guideline to follow, however it may shut students out of the chance for thinking the way of learning themselves. In addition, there is another difficulty to provide appropriate guideline for all students who are under various situations. So, is it possible to provide something to help the students under various situations to think their way of learning? In this paper, we would like to provide a solution for the problem.

In the following sections, we propose a pattern language for active learners in order to share several 'knacks' against the way of learning. It means that we apply the method of pattern languages into learning design<sup>1</sup>, as well as architectural design (Alexander 1977), software design (Beck and Cunningham. 1987; Gamma, *et. al.* 1995), organizational design (Coplien and Harrison 2004; Manns and Rising 2005), and pedagogical design (Anthony 1996; Bergin 2000).

First of all, pattern format of proposed pattern language is explained. Next, the summary of proposed pattern language is overviewed, and then five patterns are picked up as examples. Lastly, our practical application is presented.

## 2. Pattern Format

Learning patterns are described in the format which consists of following items: "Pattern Number", "Pattern Name", "Introduction", "Illustration", "Context", "Problem",

---

<sup>1</sup> Learning patterns were developed by Learning Pattern Project in 2008 - 2009. The members are Takashi Iba, an assistant professor, and Tsuyoshi Kato, Toko Miyake, Yuji Kobayashi, Kazeto Shimonishi, Mariko Hanabusa, Natsumi Yotsumoto, Mayu Iida, Mami Sakamoto, and Miyuko Naruse, who were undergraduate students of Keio University. Some patterns have their origins in Research Patterns (Kobayashi *et. al.* 2008) and Project Patterns (Naruse *et. al.* 2008).

“Forces”, “Solution”, “Actions”, “Related Patterns.” Especially in the catalog of learning patterns, each pattern is printed in a double-page spread, which is handed out for university students, as I will mention below.

In the first half of pattern, which is printed at the left page in the catalog, the overview of the pattern is described. At first, Pattern Number is sequential number. Pattern Name is named as attractive and memorable phrase. Next, Introduction and Illustration is provided in order to help for the reader to imagine the meaning of the pattern lively. Then, there is a list of when the reader can use the pattern as Context. The reader can search his/her necessary pattern from his/her context with using the context navigation.

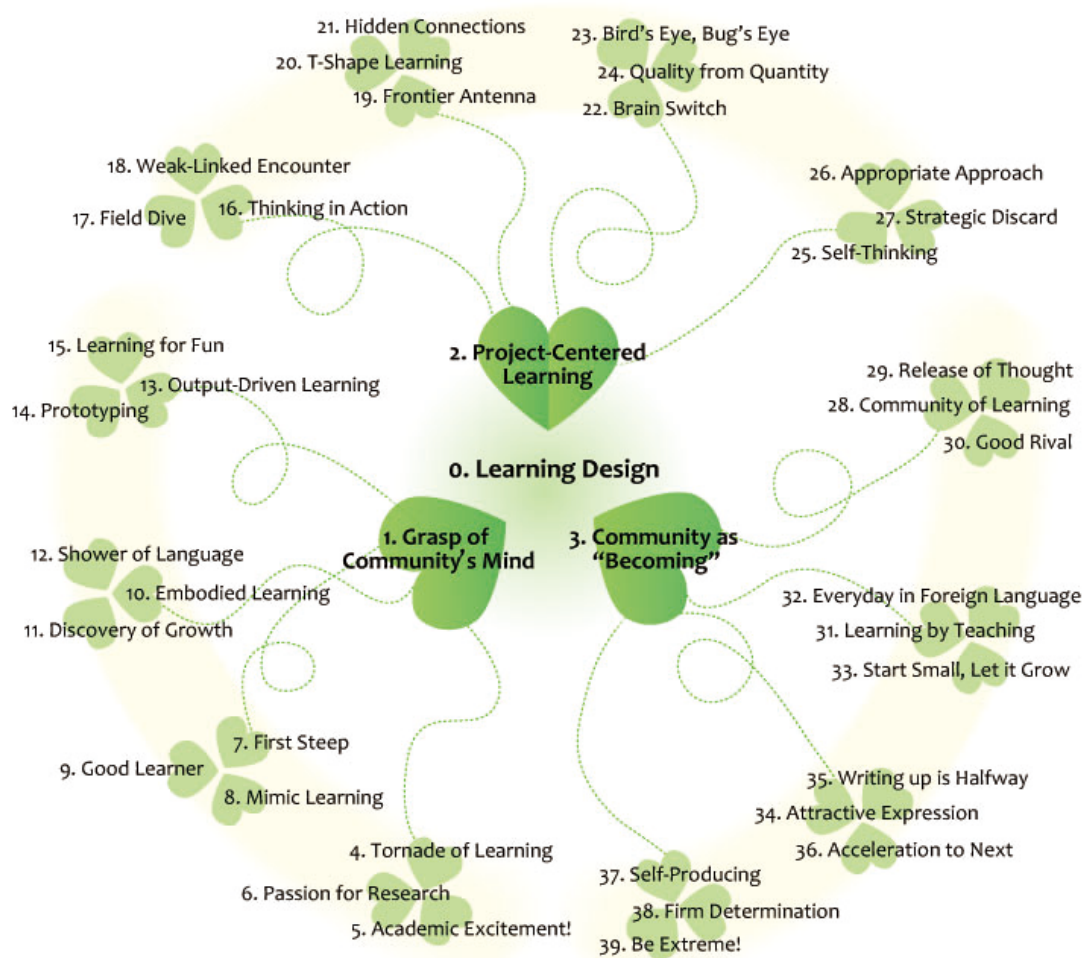
In the last half of pattern, which is printed at the right page in the catalog, the detail of the pattern is described. At first, Problem that is often occurred is described. Problem is emphasized in bold type. In succession to Problem, Forces are written as laws, which are not able to or difficult to be changed. The difficulty to solve the problem comes from the existence of these forces, because your solution needs to meet all of them. After the Forces, the separator of downward filled triangle is placed.

Next, Solution is written in bold type. Then, in the part of Actions, more concrete advice like examples or alternatives is introduced. After the Actions, the separator of downward filled triangle is placed again. At the last, Related Patterns are provided. Good learning is effectively achieved by combining some patterns. The reader can understand the meaning of the pattern deeper through reading the section of Related Patterns.

### **3. Summary of Learning Patterns**

Figure 1 shows the overview of the whole language of the learning patterns. Learning

patterns is organized in three layers according to the abstract level. In the top layer, there is a root pattern; *Learning Design (0)*. In the second layer, there are three patterns; *Grasp of Community's Mind (1)*, *Project-Centered Learning (2)* and *Community as "Becoming" (3)*. In the third layer, there are thirty-six patterns as concrete 'knack' of learning; *Tornado of Learning (4)*, *Academic Excitement! (5)*, and so on.



**Figure 1: Overview of Learning Patterns**

All 40 patterns together form a language for active learning. We begin with the part of the language that defines learning design itself. This is the fundamental and premise to use this pattern language;

*0. Learning Design*

Next, we shall go through the part of the language that gives you comprehensive attitude for learning;

*1. Grasp of Community's Mind*

*2. Project-Centered Learning*

*3. Community as "Becoming"*

Now we start the part of the language that tells how you can achieve to learn more actively in detail. This part can be roughly divided into twelve groups of patterns, where each group consists of three patterns respectively. The first group of patterns is related to motivation and fundamental aspect of learning;

*4. Tornado of Learning*

*5. Academic Excitement!*

*6. Passion for Research*

Second group of patterns shows the key to start your learning;

*7. First Steep*

*8. Mimic Learning*

*9. Good Learner*

Third group of patterns treats how to acquire and improve your skill;

- 10. Embodied Learning*
- 11. Discovery of Growth*
- 12. Shower of Language*

Forth group of patterns tells how to make your learning more interesting;

- 13. Output-Driven Learning*
- 14. Prototyping*
- 15. Learning for Fun*

Fifth group of patterns reminds the significance of active effort;

- 16. Thinking in Action*
- 17. Field Dive*
- 18. Weak-Linked Encounter*

Sixth group of patterns is related to the scope of learning;

- 19. Frontier Antenna*
- 20. T-Shape Learning*
- 21. Hidden Connections*

Seventh group of patterns give key ideas for innovative thinking;

- 22. Brain Switch*
- 23. Bird's Eye, Bug's Eye*
- 24. Quality from Quantity*

Eighth group of patterns is related to the way of going about activity and learning;

*25. Self-Thinking*

*26. Appropriate Approach*

*27. Strategic Discard*

Ninth group of patterns is about social aspect of learning;

*28. Community of Learning*

*29. Release of Thoughts*

*30. Good Rival*

Tenth group of patterns mentions how to improve your skill or works;

*31. Learning by Teaching*

*32. Everyday in Foreign Language*

*33. Start Small, Let it Grow*

Eleventh group of patterns is important idea for the final phase of activity;

*34. Attractive Expression*

*35. Writing up is Halfway*

*36. Acceleration to Next*

Twelfth group of patterns tells the strategy for the medium and long term;

*37. Self-Producing*

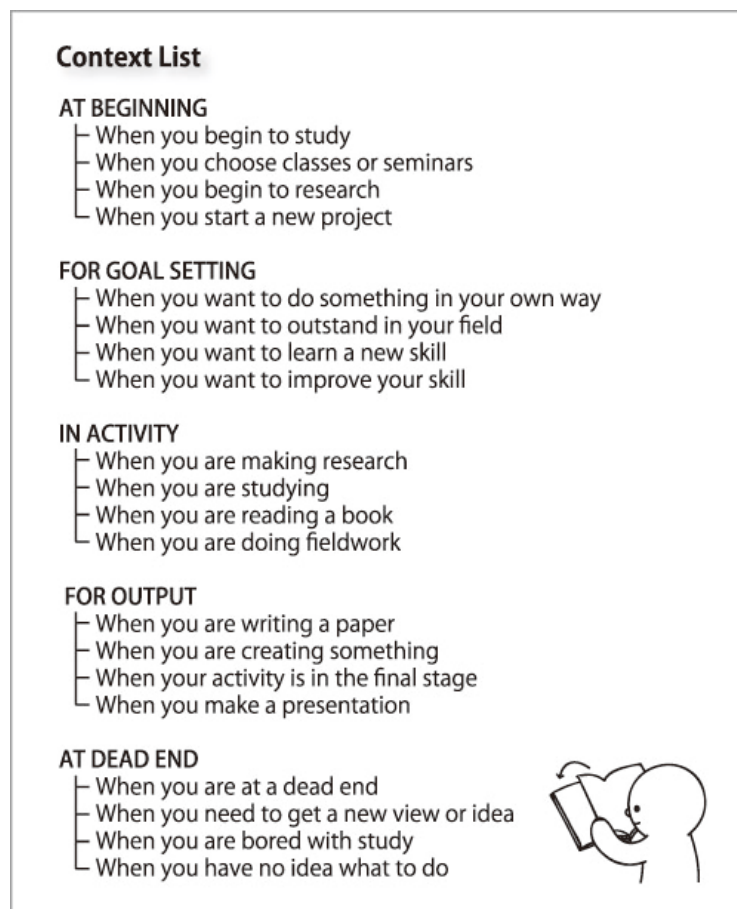
*38. Firm Determination*

*39. Be Extreme!*

The sequence presented here is not only one possible sequence, because “A pattern language has the structure of a network” (Alexander 1977). We can capture and trace

the relation among the patterns in many ways. This is related to one of Alexander's significant findings that the design of a building and a town cannot be reduced to the structure of tree, but can be considered as semi-lattice, namely network.

In the catalog, there is some navigation to find the patterns. One of the navigation is based on contexts of patterns. There are five categories of contexts: “at beginning”, “for goal setting”, “in activity”, “for output”, and “at dead end” (Figure 2). Each category consists of four contexts, which indicate related patterns respectively. Therefore the reader can find patterns that are relevant to their situation.



**Figure 2: Context List of Learning Patterns**



Another navigation in the catalog is provided in association with the curriculum of our university. Each course indicates to related patterns, therefore the student can find the patterns that are relevant to the classes they are taking.

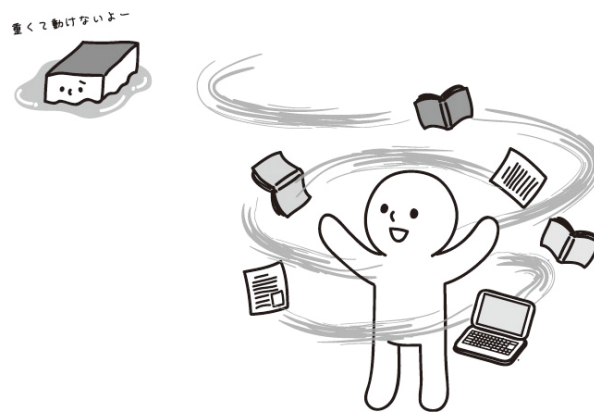
#### **4. Five Learning Patterns as Examples**

In this section, we take five patterns as examples as follows; *Tornado of Learning (4)*, *First Steep (7)*, *Output-Driven Learning (13)*, *Hidden Connections (21)*, and *Release of Thought (29)*.

No.4

## Tornado of Learning

*Learn like 'tornado' in which you take knowledge,  
rather than merely absorbing water into a sponge.*



When you are studying

When you are reading a book

When you are making research

When you want to do something in your own way

\* \* \*

**Effective learning doesn't bring about by just staying there and receiving information.**

- Human don't percept all information in the world but do a part selectively.
- People tend to be bored with reading or listening what is one-way.

- Since lectures and books don't give the exact knowledge for each learner, they have to look for the connection with their own interests.
- People can understand a new thing deeply when it is connected with the knowledge they have already had.



**Grab knowledge in connection with your interest like 'tornado' of learning.**

- First, think about what your interest is. That will be the origin of "tornado of learning".
- Choose classes or books, comparing with your interest. You can have some interests at this point.
- Do NOT just stay there and receive information. Be aggressive to grab it. When you taking notes and reading books, focus on what you think important.
- Do NOT just store the given knowledge. Mix them up and find connections among the knowledge. Write your ideas on notebooks or books as you are reading.

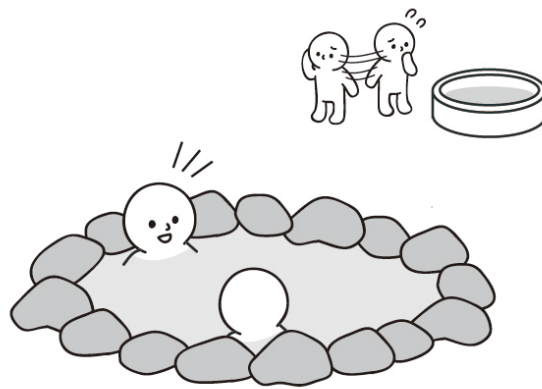


People bring themselves to study hard to acquire the knowledge in need. That is because people collect information voluntary to achieve your goal, and relate it with other knowledge for effective use. *Output-Driven Learning (13)* makes use of this pattern's effect. Also, it is important for *Tornado of Learning* to choose a theme that you have *Passion for Research (6)*. Asking someone to be taught makes you a *Good Learner (9)*.

No.7

## First Steep

*First step is to steep yourself in the domain.*



When you begin to research

When you begin to study

When you choose classes or seminars

When you want to outstand in your field

When you are doing fieldwork

\* \* \*

**Hesitation bears nothing.**

- People tend to be passive for what they don't know.
- People often get to understand something by practicing.

- People often figure out the reason of their decision while they are in action, even if they decided it with their intuition.



**Take a first step easily. Once you started, take it seriously.**

- First, decide roughly the theme of your research or activity. At this time, you can believe your intuition even if you can't find a clear reason.
- Join the seminar that seems to be interesting. Go to the field and spend time in there.
- Think all over again about your research or activity on a basis of your feelings through this process.

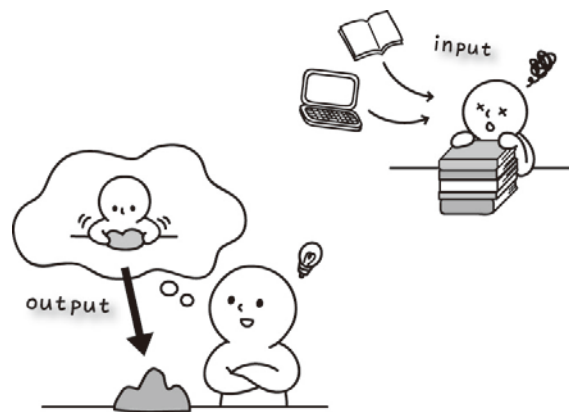


Stop “acting after thinking”, and do *Thinking in Action (16)*. This is the very spirit of *First Steep*. It is better to start *Mimic Learning (8)* and be a *Good learner (9)*, when you begin a new research or activity. Furthermore, you can see the actual problem by *Field Dive (17)*.

No.13

## Output-Driven Learning

*Inputting a given knowledge to you  
is not only way of learning.*



When you are studying

When you choose classes or seminars

When you want to learn a new skill

When you want to improve your skill

When you have no idea what to do

\* \* \*

**It is not easy to accumulate knowledge if not interested in.**

- People become aware of their limitations by creating or practicing something.
- Learning is motivated by the need to achieve what people really want to do.

- “Trial and error” is essential to make an output.
- To create something is nothing less than to express themselves, because it is inevitable to select a way from many other possibilities with their own tastes and thoughts.



**Accumulating knowledge and Improve your skill in the use of them.**

- Be in the situation of making an output and work on hard.
- Improve your skill in the process.
- Evaluate your output from the objective standpoint and also others' feedback.
- Reflect back upon the process, and think what knowledge or skills you should learn more. Then, make the future works better.

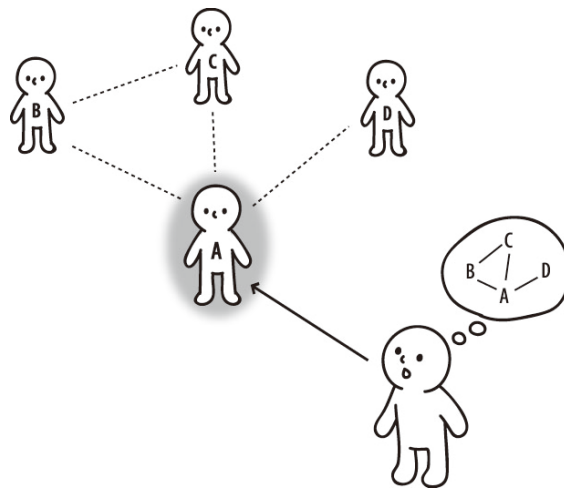


Output-Driven Learning begins making an output, not getting an input of knowledge. In other words, it is to learn with Tornado of Learning (4). For good practice of this pattern, you should consider an Appropriate Approach (26) and learn what you need indeed. Output-Driven Learning can be considered as a kind of Prototyping (14) for improving yourself. The key of Output-Driven Learning is that it can bring about actual products, which can be a building block for Self-Producing (37).

No.21

## Hidden Connections

*Unexpected connection is really exciting.*



When you are studying

When you are making research

When you are reading a book

When you need to get a new view or idea

When you choose classes or seminars

\* \* \*

**Typical classification doesn't bear a brand-new idea.**

- There is nothing exist by their own. Everything has connections with one another.
- Existing classification is just a criterion that someone had made.



- It is necessary to find new meaning of connection among things in order to acquire a new point of view.
- Increasing the number of elements brings about the difficulty to grasp a whole due to drastic increase of connections among them.



**Find hidden connections among the things to get inspiration.**

- Find hidden connections according to words that are used over the discipline. Or seek hidden connections among researchers who are referred in their papers and books. In the case of campus life, look for unexpected connections by thinking about the relationships among different types of classes that one professor has.
- Think why things that seem not to be related have connections one another and add your own logic to it. After that, think about other elements as well, and imagine something new.
- It is easier to grasp a whole of connections by drawing the map if there are lots of elements.

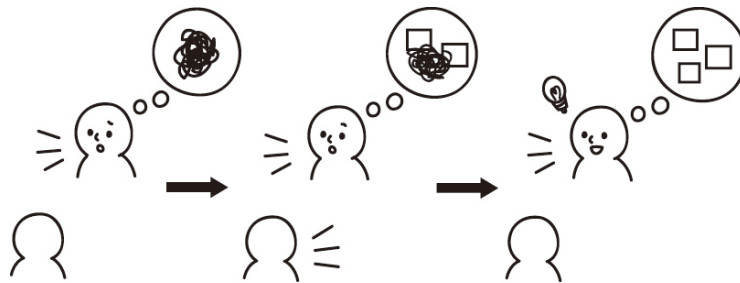


You would suddenly get to figure out the *Hidden Connections*. This situation might be caused by *Field Dive (17)* or *Weak-Linked Encounter (18)*. Also, it is important to keep the wideness in *T-Shape Learning (20)*, because you can't be aware of the connections beyond the discipline if you don't know them. You will feel *Academic Excitement (5)* when you find a connection among things, which is different from the existing classification.

No.29

## Release of Thought

*Talking about your idea  
is getting a chance of reflection.*



When you are making research

When you are studying

When you are at a dead end

When you have no idea what to do

When you are writing a paper

\* \* \*

**Thinking alone often brings you to a dead point.**

- It is difficult to explain a subject what a person doesn't understand.
- It is difficult to understand the story that is not organized logically.
- People need to organize their idea to make other people understand.
- People often can't notice their lack of understanding.

- Finding what we don't understand is good way to know what we should understand next.



**Talk with somebody and sophisticate your thought, looking his/her reaction carefully.**

- Find someone who would listen your thoughts and talk what you think.
- If he/she can't understand your idea, explain and rephrase it. If the person seems to have an interest in your thoughts, try to explain that part more.
- Reflect on the good things and the bad things about your presentation.
- Try to tell your thoughts to other people. Keep trying to express your thoughts attractively.



Talking about your unclear thoughts can be considered Prototyping (14) of thoughts. Doing “trial and error” is effective for your Attractive Expression (34). Furthermore, making Community of Learning (28) brings more chances to Release of Thought. Release of thought is also key nature of Learning by Teaching (31).

## 5. Practical Application for University Education

As a practical application, we have made and handed out the catalog of learning patterns to undergraduate students. The catalog is A5 sized booklet, and the part of pattern description is designed as a double-page spread (Figure 3). We put some thought into designing the booklet, especially for readability and attractiveness. The catalog was handed out to approximately 3,600 students of two faculties of Keio University, Japan; Faculty of Policy Management and Faculty of Environment and Information Studies.

These faculties have implemented a unique curriculum that is interdisciplinary and non-graded. It means all undergraduate students can study any kind of academic areas without reference to their grades and experience; for example social innovation, public policy, global strategy, environment, life sciences, and information studies. Therefore the students should design their own learning, and it is the reason why we made the learning patterns for supporting learning design.



Figure 3: Catalog Booklet of Learning Patterns

## 6. Conclusion

In this paper we proposed a pattern language for becoming active learners. We believe that the method of pattern language is good way to help the student to design their learning, because it focuses on providing a new view for the reader so that they can think. It is quite important that the method is not easy way to get the result without thinking themselves. It is not, however, irresponsible way to leave all up to individual ability. It is considered as the way that tolerates individual ability while making a good use of abstract rules of past experience.

Last of all, we would like to note that proposed pattern language was developed with undergraduate students. The development process could allow them to understand deeply the way of learning. We also think the fact is meaningful, just because of the circulation of the knowledge in the university.

## Acknowledgment

We would like to do our best to thank you for other members of Learning Pattern Project at Keio SFC; Tsuyoshi Kato, Yuji Kobayashi, Kazeto Shimonishi, Mariko Hanabusa, Mayu Iida, Mami Sakamoto. Wonderful pattern language and this paper would not have happened without their collaboration. We are also grateful to PLoP organizers and participants, especially Linda Rising, Bob Hanmer, Ademar Aguiar, Joseph W. Yoder, Ricardo J. Lopez, and Christioan Kohls for discussing the idea and method of pattern languages. In the last, we are grateful to Christopher Alexander for inventing the idea of pattern languages and taking a great step to open collaboration.

## References

Alexander, C., S. Ishikawa, and M. Silvertein. *A Pattern Language*. Oxford University Press, 1977.

- Alexander, C., *The Timeless Way of Building*. Oxford University Press, 1979.
- Alexander, C., H. Davis, J. Martinez, and D. Corner. *The Production of Houses*. Oxford University Press, 1985.
- Anthony, D. L. G. "Patterns for classroom education" in J. M. Vlissides, J. O. Coplien, and N. L. Kerth, editors, *Pattern Languages of Programming 2*. AddisonWesley, 1996.
- Beck, K. and W. Cunningham. "Using pattern languages for object-oriented programs", in *OOPSLA-87 workshop on the Specification and Design for Object-Oriented Programming*, 1987.
- Bergin, J. "Fourteen pedagogical patterns". In *European Conference of Pattern Languages of Programs*, 2000.
- Coplien, J. O. and N. B. Harrison. *Organizational Patterns of Agile Software Development*. Prentice Hall, 2004.
- Gamma, E., R. Helm, R. Johnson, and J. Vlissides. *Design Patterns : Elements of Reusable Object-Oriented Software*. Addison-Wesley, 1995.
- King, I. F., *Christopher Alexander and Contemporary Architecture: a+u Architecture and Urbanism, August 1993 Special Issue*. a+u Publishing, 1993.
- Kobayashi, Y., M. Yoshida, A. Sasaki, and T. Iba. Research patterns: A pattern language for academic research. In *15th Conference on Pattern Languages of Programs*, 2008.
- Manns, M. L. and L. Rising. *Fearless Change: Patterns for Introducing New Ideas*. Addison-Wesley, 2005.
- Naruse, M., Y. Takada, Y. Yumura, K. Wakamatsu, and T. Iba. Project patterns: A pattern language for promoting project. In *15th Conference on Pattern Languages of Programs*, 2008.