

# 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. Summary of Learning Patterns
  2. Five Learning Patterns as Examples
  3. Practical Application for University Education
  4. Conclusion
- Acknowledgment
- References

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<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. Summary of Learning Patterns

In this complex society, it is essential to find problems and think of solutions from various point of view with a critical mind. People, especially students, need to learn ability to practice their ideas, and create new viewpoints and methods of thinking. However, this ability can not be learned by just absorbing or accumulating particular knowledge of one existent viewpoint. Students should consider their ways of learning based on their own situation. Some students can practice good learning, which is positive and creative, but others do not know how to learn the ability. This is a big problem. In addition, 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 these problems. The patterns are mainly for the students, but they are also for the educators. The patterns will become a good tool for sharing the way of thinking.

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 refer the mind and the writing format of pattern language 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).

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<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).

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.

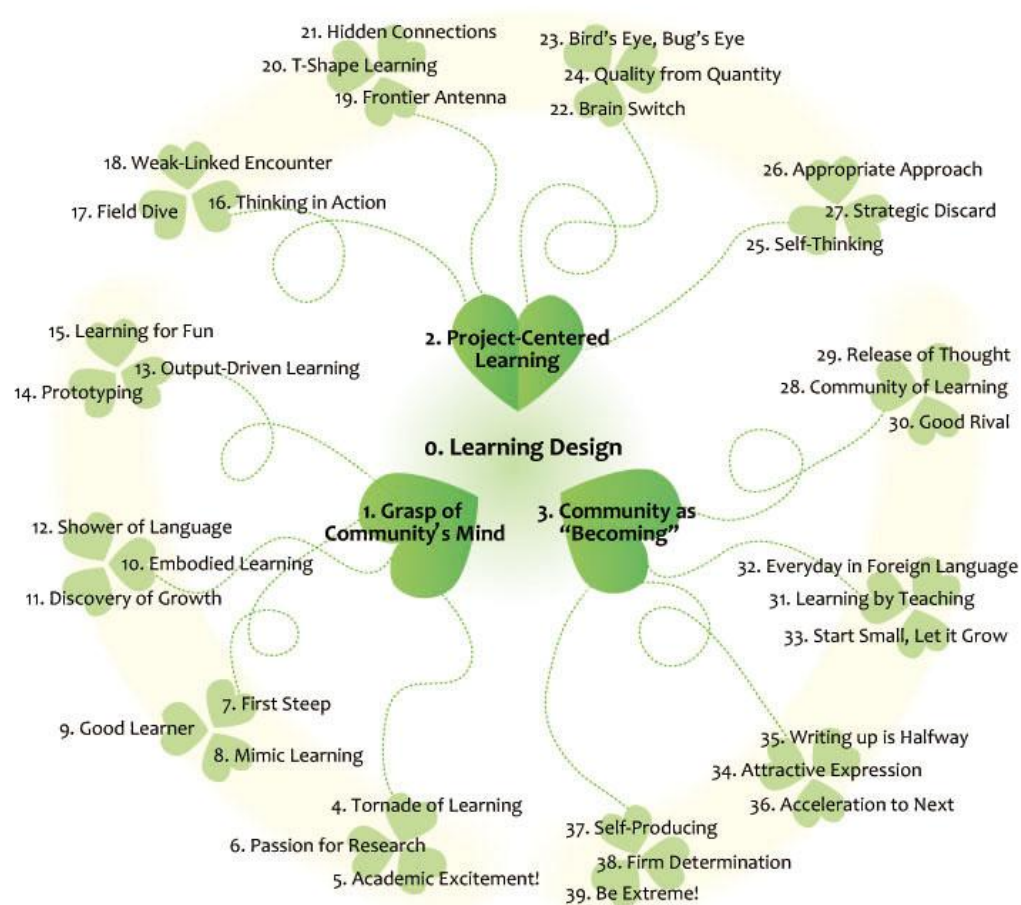
Learning patterns are described in the format which consists of following items; “Pattern Number”, “Pattern Name”, “Introduction”, “Illustration”, “Context”, “Problem”, “Forces”, “Solution”, “Actions”, “Consequences”, “Known Uses”, “Related Patterns.” Especially in the catalog of learning patterns, each 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 given for searching convenience. 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 moderate rules, 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. After the separator of downward filled triangle is placed, there is a Consequence. This part tells you how you will be with

using the pattern. Below of that, Known Use is written. It is a little story about the scene when the pattern was born. 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.



**Figure 1: Overview 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.

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.	Fundamental	<i>Learning Design</i>
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Next, we shall go through the part of the language that gives you comprehensive attitude for learning;

1.	Comprehensive Attitude	<i>Grasp of Community's Mind</i>
2.		<i>Project-Centered Learning</i>
3.		<i>Community as “Becoming”</i>

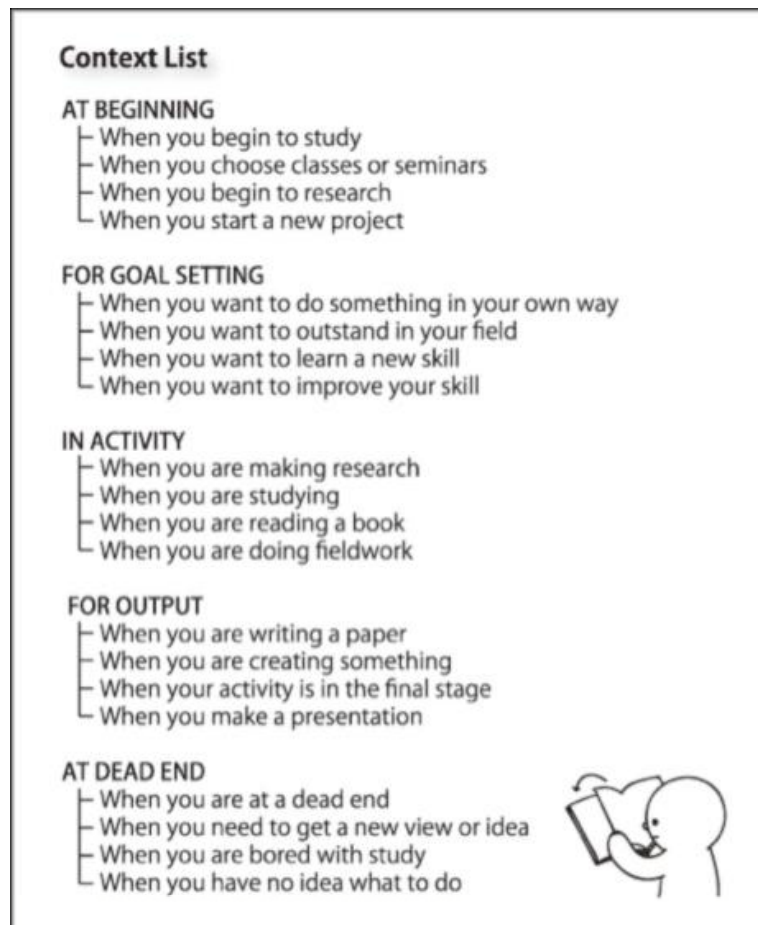
Now we start the part of the language that tells how you can achieve to learn more actively in detail. This part can be roughly divided into twelve groups of patterns, where each group consists of three patterns respectively. The first group of patterns is related to motivation and fundamental aspect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

4.	For Motivation and Fundamental Aspect	<i>Tornado of Learning</i>
5.		<i>Academic Excitement!</i>
6.		<i>Passion for Research</i>
7.	Key to Start	<i>First Steep</i>
8.		<i>Mimic Learning</i>
9.		<i>Good Learner</i>
10.	Acquire and Improve the Skill	<i>Embodied Learning</i>
11.		<i>Discovery of Growth</i>
12.		<i>Shower of Language</i>
13.	Make Your Learning More Interesting	<i>Output-Driven Learning</i>
14.		<i>Prototyping</i>
15.		<i>Learning for Fun</i>
16.	For Active Effort	<i>Thinking in Action</i>
17.		<i>Field Dive</i>
18.		<i>Weak-Linked Encounter</i>
19.	Scope of Learning	<i>Frontier Antenna</i>
20.		<i>T-Shape Learning</i>
21.		<i>Hidden Connections</i>
22.	For Innovative Thinking	<i>Brain Switch</i>
23.		<i>Bird's Eye, Bug's Eye</i>
24.		<i>Quality from Quantity</i>
25.	The Way of Going about Activity and Learning	<i>Self-Thinking</i>
26.		<i>Appropriate Approach</i>
27.		<i>Strategic Discard</i>
28.	Social Aspect of Learning	<i>Community of Learning</i>
29.		<i>Release of Thoughts</i>
30.		<i>Good Rival</i>
31.	Improve the Skill or Works	<i>Leaning by Teaching</i>

32.		<i>Everyday in Foreign Language</i>
33.		<i>Start Small, Let it Grow</i>
34.	Idea for the Final Phase of Activity	<i>Attractive Expression</i>
35.		<i>Writing up is Halfway</i>
36.		<i>Acceleration to Next</i>
37.	Strategy for the Medium and Long Term	<i>Self-Producing</i>
38.		<i>Firm Determination</i>
39.		<i>Be Extreme!</i>

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 to 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.



## 2. 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). Table1 show which contexts each of five patterns belongs to.

**Table 1: Five Patterns and Context List**

A	B	C	D	E	F
	Tornado of Learning	First Steep	Output-Driven Learning	Hidden Connections	Release of Thought
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	○				
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		○			
When you want to learn a new skill			○		
When you want to improve your skill			○		
When you have no idea what to do			○		○
When you need to get a new view or idea				○	
When you are at a dead end					○
When you are writing a paper					○

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

\* \* \*

You can just accumulate knowledge, but  
cannot learn to deepen your critical mind and interests.

- 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.



A piece of information becomes a piece of related information. That helps you grasp a total comprehension. You can improve a sense of catching information.

\* \* \*

Mikio is interested in social simulation, so he took classes about not only programming but also sociology or philosophy. But he hardly understands deeply about all of them. He thought that was not so good, so he decided to make efforts to learn new things with checking and comparing with his interest.

After that, he became able to “grab” new information with connecting his own knowledge. This led him manage to see a phenomena from many aspects, and it is good for his skill for making a model of social simulation.

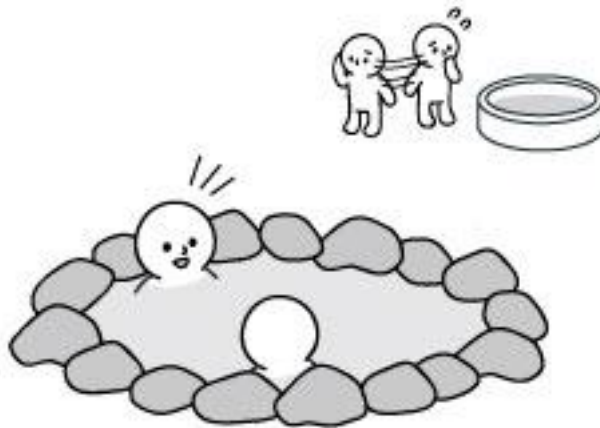
\* \* \*

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)* is one of the practical activities based on this pattern. 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 stand out** 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.



**Before you begin to do something new, you always think of the reason for it and waste much of time.**

- 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.



You will come up with new ideas and thoughts. You may find a brilliant book, or may meet a remarkable teacher.

\* \* \*

Daigo was eager to start doing a research, but he couldn't decide the theme of research. That is because he thought he should have had a certain reason of choosing the theme. However, he realized he couldn't start it with considering the reason. Therefore he started a research of education, because he felt that seemed to be just "interesting". He worked so hard, and he noticed that reason why he chose the theme is getting clear as he keeps on research. Finally, he was able to consider his future work and his research so seriously.

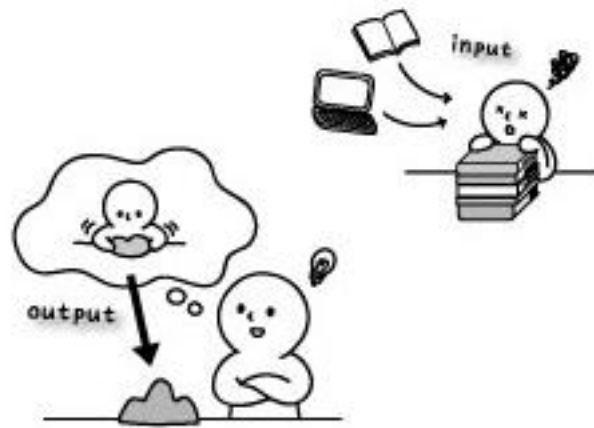
\* \* \*

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

\* \* \*

When you begin to research after you input the knowledge,  
you have to study at random and do not know what knowledge or skills you need.



- People become aware of their limitations by creating or practicing something.
- Learning can be motivated by the need to achieve what people really want to do.
- “Trial and error” is important process of making 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.



You can realize your present state. It tells you what you need to do for the next.

\* \* \*

Hakase wanted to be a programmer but he was tired of normal boring practicing. One day he came up with the new idea of software and he started to build it. Hakase read many books to build the software as codes, algebra, and arts. Finally when he finished a simple software building, he had got an enough skill of programming. The output became a good tool to share his mind to others, and he was able to notice the skill which he had to learn next.

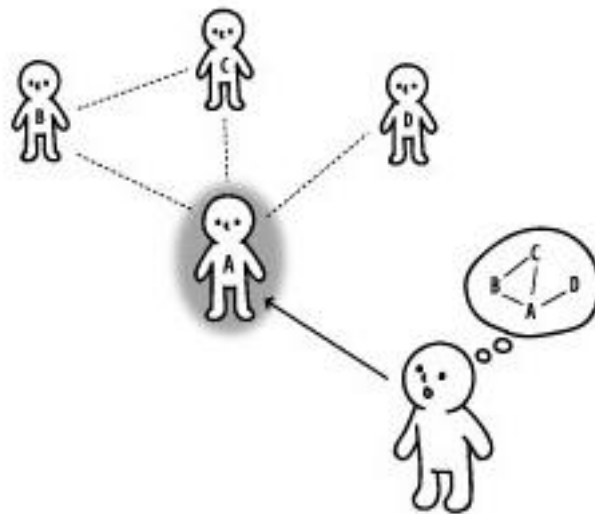
\* \* \*

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

\* \* \*

You want to see things from a new point of view for a fruitful research,  
but you don't know a concrete way.

- All the individuals have 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 can see the world from a different point of view. The new ideas may come to your mind.

\* \* \*

One day, Kazeto went to a lecture of his favorite professor. That lecture stimulated Kazoo's interests and he was so satisfied.

Kazeto spoke to a lady next to him, and he noticed that she has been studying and

doing a research in fields which is completely different from Kazeto. This experience made Kazeto notice that the things which seem to be different can have connections, and that, this kind of things may often happen.

Through this experience, Kazeto realized these two different fields are related each other with “hidden connection”.

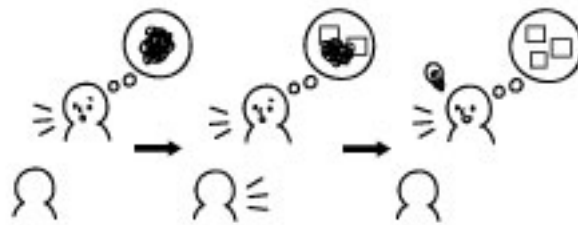
\* \* \*

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

\* \* \*

**You cannot organize or improve your vague ideas for yourself.**

- 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.



You can organize your ideas when you choose words to explain your thought. Your ideas will be polished in the process of talking.

\* \* \*

Tenshin thought of himself as a professional of Social System Theory. One day, one of his friends asked about Social System Theory to him, and he answered to that question. Tenshin thought his answer was perfect, but his friend didn't seem to understand. Tenshin realized his understanding was not enough, and some parts of understanding were vague.

So Tenshin tried to organize his understanding again, and explained to someone about Social System Theory again and again. This led him to get refined his ability to explain and understand Social System Theory more deeply,

\* \* \*

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).



### 3. 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

#### 4. 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

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