

Learning to Teach and Learning to Learn

Running a Course

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Introduction

These patterns belong to the category of pedagogical patterns [5]. They provide an ability to communicate proven solutions to common problems in teaching.

While many ideas are presented at OO conferences and published in journals each year about design, relatively little attention has been paid to effective techniques in didactical and social issues for educating people.

The intended audience of this paper are educators who care not only about what they are teaching but also on how they are mediating the topics. This paper wants to address the learning part on the students' side as well as the teaching part on the educator's side.

The foundation of these patterns were recognized in industrial training settings. So it is not clear how well they can be applied in an academic environment.

The courses where these patterns have been applied were all related to object-oriented topics. Still, they may also be applied to other areas.

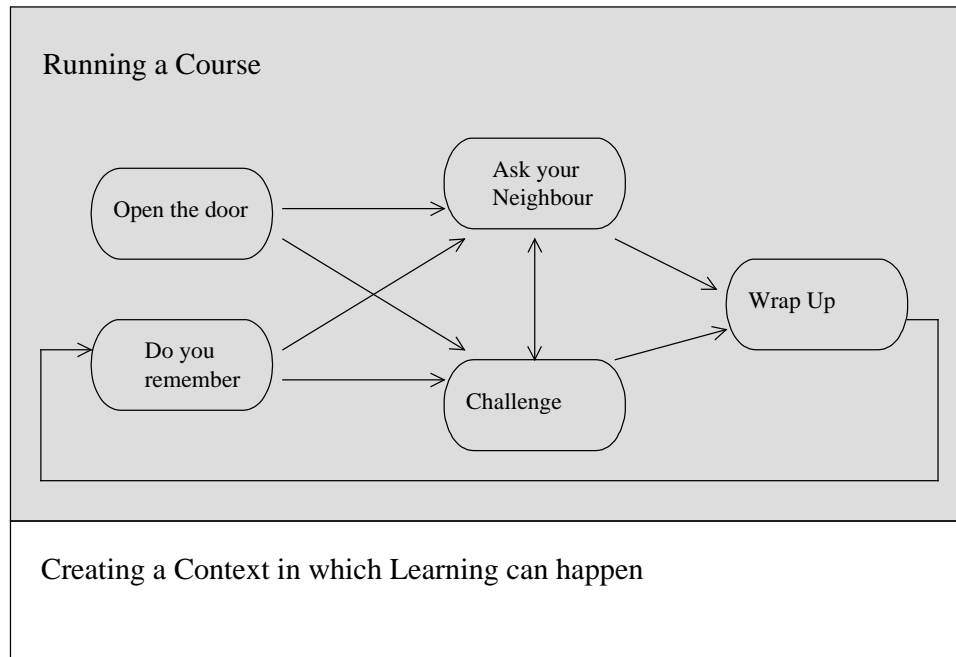
Overview

The structure of these patterns is similar to the one introduced by Andreas Rueping [6]. The problem section formulates an issue as a question. The forces are the considerations which lead to the solution. The solution answers the question of the problem section. The solution is then further discussed in the discussion section by presenting some examples or by pointing to the draw backs of the solution. Some of the patterns provide an additional related patterns section. Each pattern formulates a thumbnail printed in boldface. The thumbnail is assembled from the problem statement and the first paragraph of the solution section. Andreas referred to them as pattlets.

The presented patterns have to be regarded as a work in progress towards a pattern language. The following diagram shows the relationship between the patterns, which have been discovered so far. They are mostly focusing on the learning to teach area.

As I worked on this paper, I realized that I had wandered into a wealth of industrial training related patterns. You could say I found the first few nuggets in a unknown and vast gold field.

I decided to name this gold field *Creating a Context in which Learning can happen* as that seems to describe the magic embodied in each pattern found. In this paper, I offer you my first five discoveries or patterns. No doubt I will continue to mine this area, as more wisdom and insight come to me.



The patterns presented in this paper are all interrelated. The first one *Open the door* addresses the problem on how to start a course. *Ask your neighbor* and *Challenge* could be used several times during the course, where as *Wrap Up* either concludes a session or even a whole course. *Do you remember* is used when proceeding further after a break. In a typical industry training setting this would be used for starting a new day.

1 Open the door

... there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.

Niccolo Macchiavelli, The Prince

Problem

How to find a good start position for a course?

Forces

You want to break the ice and you want also to provide a smooth introduction to the topic.

You do not know all of the participants and the participants do not know each other.

You want the participants to be open minded but you realize by entering the room, that they are not confident about the instructor or about the course.

You want to know the participants in the sense of their skills (technical and social), of human aspect, of their expectations and you want to get some insight in their every day work. But you might have to teach several courses in a curriculum where you will meet some of the participants several times. Therefore you can't have the same opening for every course.

Solution

The participants introduce themselves in a way which is at the same time an introduction to the topic.

- Smiley: Ask the participants to introduce themselves by their name, and by answering the following questions:
 - ☺: "What do you think we can all contribute to make this session successful?" With 'we', we mean the participant herself, the instructor or the whole group. This question could be answered with a short phrase at the white board in a column led by a smiley.
 - ☹: "What do you think we can all contribute to make this session a disaster?" The meaning of 'we' is the same as above. This question could be answered in the sad face column.
- Ball: Throw a koosh-ball to each participant by asking the questions you would like to have them answered for better knowing them.
- Partner Interview: Let them interview each other but make sure to clarify which questions you would like to have them answered. Make sure to watch the time, people tend to talk forever.
- Dreams: This is not a complete opening method as the others are, it is rather a helper which could be used in all the other openings. Just ask the participants about their dreams or rather what they would do if they wouldn't do what they are doing right now.

Discussion

- For participants which seem to be defensive or even worse aggressive choose the *Smiley* opening method. By making it obvious how they can influence the unsuccessfulness of the course, they will have a hard time to really disturb the session.
- For people which seem not to be open minded use the *Ball* opening. It seems by catching the ball the people do not only have to open their arms, but they additionally open their mind. This is a good opening for an OO introductory course, because you communicate at the same time the concept of objects responding to messages.
- The *Partner Interview* is a perfect opening for any course related to distributed objects, because it shows how every object could be a server object at one point and a client object at another point.
- I found *Dreams* is always a good icebreaker, if you hear that one participant dreams about running a pub and another one about living in a hut in the mountains. Often this tells you more about the people than all the other *serious* questions.

2 Ask your neighbor

Together we are strong.

Idiom

Problem

How to keep the students from focussing on the teacher?

Forces

When students struggle, it is much easier for the students to ask the teacher; however, in the work environment the teacher will not be around.

Often the students trust only themselves and the teacher, but they could work much more efficiently if they would accept also help from another student.

A single person often gets stuck when a problem occurs, but a group of people always provides a great mix of experiences and ideas.

Some students are afraid of asking questions in front of the whole group, but you want everybody actively participating in the course.

Discussions with the whole group tend to be teacher-centered, where the roles of the ones who are posing and answering the questions are fixed. But everybody in a group could provide both questions and answers.

Often students can not imagine how they can transform what they have learned in a course into their work environment without the backup of a teacher. However in the work environment their colleagues could serve as the backup.

A group of participants have most often diverse skills. This becomes obvious when the students have to do some practical stuff like implementing some methods. Some students are much earlier done than others. On the one hand you don't want the fast people sitting around being bored (or even worse doing strange things with your equipment) and on the other hand you want to give everybody a chance to finish the exercise.

Solution

Assign a problem to your students. When they start to ask about the solution because they are stuck, invite them to ask their neighbors by making a tour through the other teams. The students have to figure out what the other teams are doing and also to discuss their problems with them, or asking the other team how they dealt with this problem.

At least one member - the presenter - of the team stays at the teams location. All the other members of each team wander around and ask the presenter to explain the solution of her team. The agents are allowed to ask any question, they can even bring up their problems, perhaps the other team had also a discussion about this problem.

A single team should consist out of two to ideally five people. By assigning smaller and more intimate groups of people also shy people have the courage to actively participate in discussions. Additionally working in teams changes the attention of the students away from the instructor towards their colleagues. This way the experiences of all the participants are used as a rich resource for learning.

Each participant has valuable questions and answers, use this fact by inviting the participants to take different roles (agents or presenters) in changing groups.

Discussion

It is helpful having enough students to be able to split them up into at least two teams. Variant: No teams, every single person works on her own, but has at least one neighbor to ask.

Use this pattern in a short form, by allowing to interrupt another team by asking them if they also came to that problem and how they solved it.

Use the people who are grasping the topics faster as coaches for the ones, who have more problems to adopt the stuff.

Asking your neighbor may lead into a big group discussion. The teacher has to take care that not all the time will be spent for discussing all different opinions (watch out for the five people five opinion problem).

It is much harder to implement this pattern in countries where the mentality of the people does not allow them to admit that they need help or where the people were regarded as impolite if they would admit that they do not know the answer.

Related Patterns

Round and Deep from Helen Sharp could be used as the basis for *Ask your neighbor*. An experienced student is likely to gain a deep understanding of a complex concept by relating it to his or her own experience. But the same experience which results in a deep understanding may also limit it because a round and deep understanding of a complex concept can only be achieved by considering different perspectives. (published at the pedagogical patterns home page)

Cardboard Consultant (also known as: Discuss it with your spouse. Tell it to your dog.) from Charles Weir and John Noble often helps in its own right. Explaining your problem in detail can be very valuable, even if there's little chance that the 'listener' will be able to find a solution. Your listener maybe human, animal, plant or artifact. Some people like to explain things to their dog, or to a character in a picture. Other tell their spouse or a passing friend. Describe the problem in detail, assuming an intelligent listener with only a basic background in the problem domain. The process of explaining the problem forces you to look at the issues from a different point of view. Typically this generates ideas to new approaches to the problem, or suggests one or more 'obvious' misconception in your logic. (published at EuroPLoP 99).

3 Challenge

*Not because things are difficult, we do not dare them. Instead
because we do not dare them, they are difficult.*

Idiom

Problem

How to challenge the trainees so they develop their own solutions?

Forces

You want to teach complex concepts, but you do not want to provide solutions.

You want the trainees to uncover solutions for complex problems by drawing on their own experience rather than solely let them approve what they have learned by listening.

Students expect the one and only right solution to a problem from the instructor. But often there is no single answer, but many equally correct answers.

Solution

Before lecturing about a new topic, present a problem taken from the problem area of the trainees. Provide some hints via questions which have to be answered and which may lead to a solution.

Prepare the students for what they will have to do on their own, so the objectives are clear. You might also want to point out where they have to be cautious and where to focus on.

Ask the students to develop several solutions with accompanying criteria for defining the context in which the solution works well.

Discussion

Developing several solutions is often automatically done, when working in teams. Each team develops a different solution. The challenge is then to also provide the criterias for the context, so the other teams could be convinced. If the participants come up with only a single solution, the instructor has to provide some additional ones.

Make sure to discuss afterwards what they have learned (without using the "killer" question: "Any questions?"). And do not forget to figure out the human reaction, for example how they felt, especially if they were overwhelmed.

Often the students are irritated or uncertain how to progress. Some people aren't able to handle a situation like this at all. If this is the case, then the trainer has to provide hints, so the students are able to overcome their own uncertainty and handle the situation for themselves. The difficulty for the educator is to find the optimum way between giving a structure (so the students don't explore for themselves anymore) and *laissez-faire*, which could be interpreted as an indication for an incompetent trainer.

Sollmann found out in [7] the more often the students are in this uncertain situation the better they can handle this kind of situation, or rather the longer it takes till they really feel uncertain. The effect is like in a physical training setting, the more often you are overcoming your limits, the higher your limits will raise.

Related Patterns

The pattern could also be used in conjunction with **Mission Impossible** (also known as: Kobayashi Maru) from Alan O'Callaghan. The Mission Impossible pattern is used to make learners suspicious about their understanding of important Object Technology concepts so that they continually question those concepts and improve their understanding of them. Learners occasionally need to be "shocked" into deeper thinking about what they are doing in order to appreciate some of the subtleties. This is all the more necessary when such ideas as "objects model the real world" can be understood in an entirely naïve way which disarms the learner in the face of real problems when they occur. The Mission Impossible pattern achieves this by presenting apparently simple problems which cannot in fact be solved by the naïve application of received wisdom.

4 Wrap up the day

In a time of drastic change it is the learners who inherit the future. The learned find themselves equipped to live in a world that no longer exists.

Eric Hoffer

Problem

How to end a course?

Forces

You want to end a course, but you do not want the participants to run away.

In a course people might learn a lot of things, but at the end (even of a day) they are often unsure if the time was worth spent.

Solution

Provide a wrap up which repeats the main things learned.

- **Minimum Wrap Up:** The minimum you should provide is a wrap up of the day. Just mention every topic which has been covered and review the specific points people have experienced. This could of course also been turned around, instead of the instructor is doing the wrap up, the students do it themselves. This also known as *Flashlight*: Each of the participant mentions one item of the day which was important for her.
- **Reflective Wrap Up:** Ask the people to write down e.g. three things they have learned in the course and one action they want to perform in the next two weeks, because of what they have learned. You do not have to discuss these things with the whole group, but it is better not to mention this up front, because otherwise people won't answer those questions seriously.
- **Sweet Wrap Up:** Investigate in some sweets. Pass them around and dispense one of them for every item or topic remembered.

Discussion

The *Minimum Wrap Up* is very useful for summing up a session.

The *Reflective Wrap Up* - although it could also be used in the same manner as the minimum wrap up - is best used for ending a whole section or course.

You might encounter the problem with the *Sweet Wrap Up*, that you miss the students' taste or that it ruins you if the group is rather big.

5 Do you remember?

Progress, far from consisting in change, depends on retentiveness...Those who cannot remember the past are condemned to fulfill it.

George Santayana, Life of Reason

Problem

How to recapture the stuff learned the days before?

Forces

You want to repeat what the participants have learned so far, but you would also like to know how far they understood it.

Although things are sometimes complex, often they are more likely to be understood if a student uses her own words to explain the concepts to somebody else.

Solution

Provide a short exercise where the students have to express the topics in their own terms.

- Vocabulary Exercise: Write the key terms which have been used so far on the white board. Each participant can pick one, with which they are most comfortable with. So each of them explains one term.
- Questionnaire: Give the participants two to three questions, which they have to discuss in small teams, for example in pairs and which cover what have been learned so far.
- Mini project: Give the participant a very small problem to solve, which again covers most of the topics.

Discussion

It is essential for the *Questionnaire* that the questions are not too easy, so the participants have to discuss a possible answer and perhaps assemble an example for their solution.

The challenge when using the *Mini Project* is to find a project, which is really tiny. You don't want to spend too much time, you just want to review the concepts.

Acknowledgements

These patterns have been recognized by from my several years of teaching experience. My wisdom comes not only from regular training settings but also from sessions at various conferences. I want to name two of them, because they have been a critical influence on my teaching style. They are the DesignFest and the Educators' Symposium both of which are regularly held at OOPSLA.

Furthermore, it helped me to watch other trainers and I value my discussions with people in other disciplines. In particular, I value most highly my discussions with Monika Bobzien, a German psychologist.

And finally I want to thank Norm Kerth, who provided valuable feedback as a shepherd.

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