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Sørensen, Christian Malmkjær Byrge; Hansen, Søren

Published in:
SEFI 2008 - Conference Proceedings

Publication date:
2008

Document Version
Early version, also known as pre-print

Link to publication from Aalborg University

Teaching creativity involves both cognitive and affective learning processes organized as 3D cases on The Creative Platform

S. Hansen, C. Byrge

Associate Professor (corresponding author) Ph. D., Aalborg University, Department of Planning and Development, Fibigerstraede 13, 9220 Aalborg, Denmark, sh@plan.aau.dk

Ph.D. Student Aalborg University, Department of Planning and Development, Fibigerstraede 13, 9220 Aalborg, Denmark, byrge@plan.aau.dk

Abstract
Teaching creativity involves both a cognitive and an affective learning process. Creativity can be defined as our ability to perceive and respond to stimuli in a new way. Teaching creativity therefore involves both cognitive and affective learning processes. Cognitive because our thinking *is* cognitive and affective because our thinking is close related to our body movements and attitude in a specific situation.

For a three year period this approach to teach creativity has resulted in a 2 ECTS course for computer scientists at 9th semester at Aalborg University. The course is divided into three parts: A theoretical study, an intense 48-hour workshop with focus on *being* creative using both brain, body and attitude as a whole, and a follow-up period for reflection resulting in a reflective report.

The students reflective reports together with follow up interviews, indicates some promising findings. The students *do* become more creative at the 48-hour workshop in the sense that they come up with ideas that, in their own words, would not be possible in a normal group session. Another promising finding is that students that have been studying together for 4 years, after the workshop find themselves collaborating together in a less restrictive and less judgmental way where "crazy" ideas are welcome and even build on in a constructive way. In other words: the creative behavior is embodied in the students after the 48-hour workshop.

Keywords: Creativity, unlimited use of knowledge, didactic for creativity, 3D cases, The Creative Platform

1. Introduction

Professions and educations need a new discipline called *Creativity*. We need creativity when we want to *create* something. Creating should be understood in relation to all activities of the day as well as to collaborative knowledge creation at work or at school. The mind normally reacts from pattern thinking.[1] Patterns are essential for us to cope with everyday situations. Patterns help us save energy and time and to keep informed about our surroundings with a minimum of effort. However, there is a backside to it. Patterns also control our perception and thinking, which makes it difficult to perceive information in new ways, to conceptualize differently and to think and do differently in a given situation.[2] To get new perspectives or new solutions we need creativity, which means to cut across the (artificial) boundaries in our pattern organizing brain and body. Disciplines and cultures are results of structuring patterns. Creativity is to ignore these patterns and to cut across the boundaries between these disciplines and cultures.

In this paper creativity is defined as the *unlimited use of knowledge* in thinking and doing. Knowledge includes information, expertise, know-how or whatever sources our thoughts or actions might have. When we think or do something, we use knowledge. If we want to do something new, we need ideas about what and how to do it. Ideas are knowledge in action. They are building blocks of knowledge, which can be played with in a creative process that continues until the desired solution is obvious. Creativity is to play with knowledge in the search of other possibilities than the ones our pattern thinking normally would make us aware of. This definition of creativity (*unlimited use of knowledge*) implies that creativity is the mean to cut across the limiting boundaries of subjects, professions, scientific, "not scientific" knowledge, truths, lies, understandings and misunderstandings. Creativity is the only thinking that uses and combines *all* the knowledge available in a group or an individual. Creativity is the discipline of sharing and using knowledge across all profession, social, disciplinary and cultural boundaries,

Creativity is not a discipline that can be taught in a lecture like most other disciplines. To *create* is at the top of human capacity. It involves unlimited use of the knowledge a person gained throughout life. Doing that involves courage to leave the automatic responses to stimuli, which is controlled by pattern thinking. In most learning situations like lectures and working in project groups students suffer from fear of not doing the right things in the right way. This paper claims that this fear, may seem to be negligible, never the less, is the main problem, if we want students to be more creative. It is the fear every person experience when they try to step out of a pattern of normal behaviour or normal thinking. To teach creativity first of all involves creating a learning environment where the students feel confident in stepping out of their dominating patterns of thinking and doing. The key to confidence is to remove reflection from the learning process. This might sound like a strange idea because reflection is a dominating concept in engineering education. Reflection is crucial to learning when conceptualising experiences, but reflection is also as the spider spinning its web in the mind. This web of patterns controls our thinking and our doing. If we want to think and do beyond these patterns it is necessary to remove reflection from the learning process. Experience is the opposite of reflection, and likewise is the learning environments that focus on experience the opposite of those with focus is on reflection. When teaching creativity we need a learning environment that focus on experience, because the experience is the only place our perception is not controlled by our pattern thinking. In the experience all our knowledge is at our disposal. The Creative Platform offers such a learning environment.

2. THE CREATIVE PLATFORM

The Creative Platform is a highly structured learning environment where the students feel confident, are concentrated and driven by an intrinsic motivation as well as capable of using and sharing diverse knowledge[3]. The Creative Platform is a learning environment protected against any kind of judgement from inside or outside. It is an environment where the students' awareness is moved away from their discipline and their social relations. All the awareness is focused in a number of common experiences which constitutes the learning process. These learning experiences are called 3D cases.

3. 3D CASES

The essence of a 3D case is to totally engage the consciousness, leaving no room for other thoughts in mind of the student. The person become so engaged in the task that he or she only experience what is going on in the present

moment, leaving no room for reflection of old patterns. In a 3D case the participants are in flow as described by Csikzentmihalyi[4]. The method for doing so is the concept of parallel thinking[5] combined with involving body, brain and attitude simultaneously in the experiential learning.
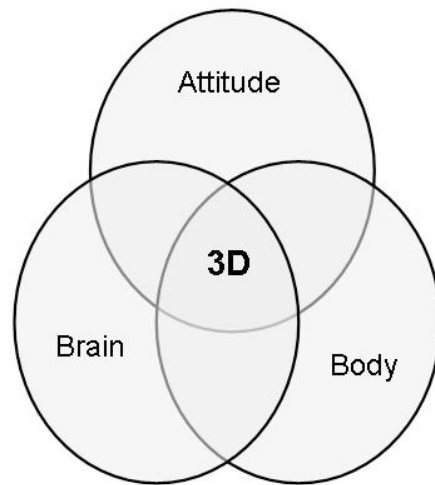

Figure 1. A 3D case involves a simultaneous and deliberate use of Brain, Body and Attitude.

3D cases allow students to experience an alternative respond to stimuli. Examples of this are "how to introduce oneself to another student" or "how to react when one makes a mistake". Normally a person responds to stimuli in an automatic response that involves language, body and attitude. In a 3D case people are guided to change language, body movements and their attitude at the same time in a facilitated process that gives the student a learning experience. An example of a 3D case is to learn "to accept making mistakes". The participants play a 3D case where they make many mistakes and practice saying: "YES, I made a mistake", raising their arms and looking happy. This way it is possible, in a step by step form, to create an environment where it is "positive" to make mistakes.

3D cases is also a pedagogical approach to open-mindedness. Experiences are always influenced by the immediate attitude in the given situation. Our attitude controls, to some extent, what we are capable of *perceiving* from an experience. The attitude can be located somewhere in between brain and body and all three of them influence each other and thereby our perception of any situation. From this it can be suggested that instead of having a purely brain to brain (cognitive) communication, learning should be dominated by communication that includes brain, body and attitude. This is illustrated in figure 1. This approach is coherent with Nonaka, who emphasizes the oneness of body and mind in innovation[6]. Basically a 3D case is to "do it", instead of "talking about it". From the experience of doing the students will be able to redo it again, while a reflective learning environment will make the student able to talk about how to do it.

A 3D case is an exercise where an individual, two or more students *do* together. It is composed with the aim to create an experience with a specific aim, for example to teach students to delay judgement of ideas, to develop the potential of an idea, to break dominating patterns of thinking, to make it easy for people with different professional, disciplinary, social or cultural backgrounds to work together. 3D cases allow a group of students to be creative by removing the barriers that mainly have their origin in fear, lack of concentration, lack of motivation and dominating patterns of thinking (limited use of knowledge). 3D cases are built on the condition of play, and they always include elements of activity, movement and interaction.

4. A 2 ECTS COURCE IN CREATIVITY FOR 9. SEMSTERS COMPUTER SCIENTISTS

As outlined above it is important to separate experience from reflection. For that reason a course in creativity for computer scientists is divided into three parts. A theoretical study, an intense 48 hour workshop with focus on *being* creative and *experiencing* creativity using 3D cases to build The Creative Platform, and a follow-up period for reflection resulting in a reflective report on the experiences in relation to the theoretical studies.

The Creative Platform helps the students to let go of how they usually tackle scientific problems. Throughout the workshop 3D cases are introduced at a certain pace that makes it impossible to reflect on how a group process used to be. A 3D case requires all of the students' attention, but they are not difficult to perform. In the beginning of the workshop the 3D cases develops a working atmosphere where it is natural to make mistakes, to speak out strange ideas and to react with possessiveness to others ideas. Later the 3D cases are focused on how to develop ideas and to seek for new ideas using *horisontal* thinking

Horisontal thinking and *unlimited use* of knowledge are two important concepts used on The Creative Platform, and in this course. Several researches have been conducted attempting to understand the generation and development of an idea. In 1952 Roe argued that a creative person has the capacity to generate unusual associations.[7] This means that a creative person can find connections between disciplines and cultures, which are not obvious to other people.[8] These connections can eventually turn out as ideas for new products, new understanding etc. *Horisontal thinking* is a structured method for finding such connections. Maier finds that creativity is to use a well-known object in an "unusual way".[9] Maier & Roe finds creativity to cut across obvious patterns to find new ones. Consider the example from 1878 of the development of the idea for the Tarnier-Martin couveuse by Stephanie Tarnier.[10] When he saw an incubator for "baby birds", in a French Zoo, he found an association to "baby humans", thus getting the idea for his couveuse. This association is to use knowledge from the field of Zoology in order to solve a problem in the field of medicine. Without unlimited use of knowledge, these two fields would have been separated and the use of knowledge for developing an incubator would have been limited to the field of Zoology, which eventually would not have had a result like the couveuse. Roes and Maiers understanding are very much in line with the *unlimited use of knowledge* across known patterns.

Horisontal thinking is to jump from a problem regarding infant mortality, via a common principal like "keeping alive", to the "baby birds incubator" and back to babies with the "new" idea of a human incubator. The aim of the workshop is to make the students experience unlimited use of knowledge through horizontal thinking. This is possible on The Creative Platform by using 3D cases.

4.1 Method
The course is developed over a three year period in which it has been performed three times. The theoretical foundation is The Creative Platform, which is a didactic approach to create new learning experiences that are not influenced by the patterns created by earlier experiences. An important source of information has been the reflective reports that all participating students wrote as an integrated part of the course. Besides the reports several follow up interviews were conducted to learn more about the long term effect of the course. Besides this specific course The Creative Platform has been used in many similar courses. The authors experience from similar courses has been used as verification.

4.2 Students arrive to the 48 hour workshop with scepticism
When working on The Creative Platform the students never know "what is going to happen next". A key principle on The Creative Platform and in the 3D cases is "One task - One deadline" taken from the concept of parallel thinking.[11] The teacher carefully plans the workshop in advance. The students are guided to follow the process, step by step, without any concern about what is going to happen next. This is a very important principal with the purpose to make it easier for the students to concentrate and focus on the task at hand, allowing a condition of flow to emerge. Because students do not know the program of the workshop, they are quite sceptical in the beginning of the workshop. This scepticism last for about 1-3 hours. The method used to handle the scepticism is a seductive process consisting of a number of 3D cases that moves the students onto The Creative Platform.

4.3 The Creative Platform is a learning environment where it is possible to let go of patterns
To let go of patterns of thinking and doing, most people need help to handle the uncertainty or fear of loosing professional or social control. A very important 3D case makes the students accept to make mistakes. Another 3D case makes them accept any thought or idea that they even cannot understand from the beginning. These 3D cases have a huge effect on the way students collaborate in the workshop. It is important to emphasise that a 3D case generates an *experience*. It will not be sufficient to *tell* students that today it is OK to make mistakes and that they should accept other students' ideas or to talk about it. The key is to have a first hand experience. That is why 3D cases are very powerful in creating changes in social behaviour. Methodically the 3D case is inspired from Keith Johnstones pedagogical approach to teach improvisation[12]. His main idea is to stop the intellect from working,

because the intellect wants (need) to analyse and understand what is going on in order to feel safe. To make improvisation possible, the intellect must surrender and for that purpose the 3D case as a teaching method was invented. The combination of the cognitive approach of *horisontal thinking* and the affective approach of *improvisation* is the key to letting go of the dominating patterns of thinking and doing.

4.4 Improvisation instead of reflection and argumentation
On The Creative Platform student improvise instead of reflecting and arguing. To improvise using 3D cases is to play with knowledge without worrying about the ontological or epistemological status of that knowledge. When students experiences that they can construct collaborative knowledge into new ideas, they get excited. Suddenly all the burdens, rules and judgements are gone and the students start to laugh and to behave energetic and without the fear of losing face, being judged, making mistakes or losing control. They start a joyful play with all of their knowledge in the same minute they get rid of the fear they have been accumulating since they were 6-7 years old and for the first time faced the power of judgement.

At this point the workshop has been going on for about 10-12 hours and now the new ideas start to arrive. At this point there are almost no scepticism left and students that worked together in groups for 4 years start to let go of the patterns they have built up doing this long period. They experience a new social relationship without the fear of not being right. An important principal on The Creative Platform is to focus on the task and *never* focus on the human relations. To be able to do this, judgement of any kind, *must* be absent.

4.5 The students' reflective reports as a mean to a reflective learning process
After the workshop the students write individually reports, reflecting on the learning experience from the workshop. In writing the report the student also reflect on the literature he or she read before attending the workshop. From reading the reports and talking to the students, this seems to be a good approach to combine practical and theoretical knowledge. When teaching creativity this is also a necessary approach because experience and reflection must be separated in time.

5. CONCLUSION

To experience flow in a working process is not an everyday event for most people. To make that possible for a class of students, the learning experience must be carefully planned and prepared for that purpose. The Creative Platform is a didactic developed for that purpose. It was developed to make it easier to participate in a creative process where unlimited use of knowledge is possible for collaborative knowledge creation. The unlimited use of knowledge takes place in an improvised play with knowledge. Horisontal thinking is a cognitive approach to cut across established patterns of thinking. When improvising with horisontal knowledge new ideas in terms of new knowledge constructions emerge.

To make it possible for students to work and think in this way, 3D cases are used as a pedagogical mean to help then let go of the fear that every human face when asked to leave the controlling professional and social patterns build up during life.

The authors of this paper have developed and used The Creative Platform for several years in many different settings both including courses for students as described in this paper and in R&D departments in private companies. Our experience is that The Creative Platform does make it easier to cut across the established patterns and to get new ideas. The platform also creates an atmosphere of joy and energy. A Creative Platform can last for anything between 4 and 48 hours, but we don not know if it can be a permanent working platform in an organization. At the moment ongoing research in Danish companies will try to answer that question.

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