

# Student-Oriented Teaching by Using an Open Innovation Game<sup>1</sup>

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## Introduction

Activating students remains a continuous challenge in university teaching as teachers aim at maximizing the learning outcome for their students. In this chapter, I reflect on my personal experience in how my teaching style affects the students learning experience. I will in particular elaborate on my experience in teaching the course Innovation in Value Networks, a Master course in the Innovation and Business Program at the University of Southern Denmark in Sønderborg, Denmark. More specifically, I will discuss the change in approach from one year to another year, which represents a change from a teacher-oriented “academic” teaching approach to a more student-oriented “practical” teaching approach. Moreover, my ultimate aim of this chapter is to explain how the use of a game can be used as a way to achieve student activation related to different types of learning. I will present both theoretical arguments as derived from the literature as well as my experience with using an open innovation game for which I will give some observations and results.

In its aim to discuss how a game enables student learning, this chapter builds on the fact that playing a game can be a source of creativity, imagination and fun, as well as it can be conducive to deep learning (Biggs & Tang, 2007; Kolb & Kolb, 2010; Ramsden, 2003). The use of games feeds into a more general theory of learning as it offers the students a platform to interact with their environment and acquire/recombine relevant knowledge, while addressing the cognitive, emotional and social dimensions of learning (Illeris, 2002, 2003). Moreover, it embeds elements of active, collaborative, cooperative and problem-based learning, not the least important in engineering programs (Prince, 2004). It furthermore extends from

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<sup>1</sup> This chapter partly builds on Bogers and Sproedt (2011).

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the domain of teaching to practice and thus offers the students useful insight into using play and game beyond this course (Roos, Victor, & Statler, 2004).

With this background, this chapter shows how playing a game can be an effective mechanism to teach students about certain concepts and practices that underlie particular elements of open innovation, which is a topic of increasing interest to practitioners, researchers and teachers who work with innovation management and related areas (Chesbrough, 2003; Chesbrough, Vanhaverbeke, & West, 2006; Dahlander & Gann, 2010). In particular, I present the use of a game that includes both co-operative and competitive elements, which are at the core of open collaborative innovation, which has been defined as an innovation process across organizational boundaries involving several human individuals as creators (Bogers, 2011b). As such, playing a game can not only help to better understand some concepts and theories behind open innovation but also help to understand and develop the competences that are required for professionals working in open innovation teams (du Chatenier, Verstegen, Biemans, Mulder, & Omta, 2010).

## **The Context: Innovation in Value Networks**

The experience that I use as a reflection on the relationship between teaching style and student learning is the course Innovation in Value Networks that I taught in the spring of 2010 and 2011. The aim of the course is to introduce the students to concepts and theories related to innovation in value network, which is an umbrella term that covers a number of recent developments in practice and academia that relate to various theoretical frameworks and practical tools related to open and distributed innovation models, such as “open innovation”, “user innovation”, “crowdsourcing” and “business model innovation” (Bogers, 2011a).

In order to achieve this aim, the course alternates between relevant concepts/theories and practical cases/exercises. More specifically, the course syllabus describes the learning objectives as follows: “The intended learning outcome of this course is to make you familiar with a number of theories and practices in the context of open and distributed innovation, and to increase your analytical and decision-making skills in the face of innovation challenges. In order to reach this objective, the pedagogical approach of the course is based on the use of teaching cases. The case method allows you to develop a deep understanding of the actual challenges and problems that companies have been facing and will face in practice. Hereby, you will also be able to understand theories underlying such practices as well as to apply concepts and tools to practical cases. By pro-

viding the relevant skills and knowledge that managers also need and develop in practice, the course offers you the basic principles and tools that are required when evaluating different approaches and opportunities for open and distributed innovation performance, which you are likely to face in your future jobs.” (Bogers, 2011a: 1)

The use of the case method is discussed in more detail below as a way to activate students through a more practical and student-focused approach. I will moreover elaborate on the specific experience of using a game to teach some concepts and practices related to open and distributed innovation.

## **Towards a Student-Oriented Teaching Approach**

### **The didactic triangle: Content-teacher-student relation**

There are different approaches to how teachers teach and how students learn certain content. For the purpose of this chapter (and the experience in my course at large), it is useful to consider the relation of the participants, i.e. the teacher and the students, which can be described with the didactic triangle, going back to Johann Friedrich Herbart (Kansanen & Meri, 1999).

### **Teacher-oriented (“academic”) approach to teaching**

The didactic triangle describes the relation between the content, teacher and student in which I distinguish between two broad approaches to teaching (Figure 1). First, there is a teacher-oriented approach that emphasizes the link between the teacher and the content. This approach reflects my initial experience with teaching Innovation in Value Network. The approach, which might be called an “academic” approach to teaching, was characterized by the use of academic articles to explain relevant concepts and theories, which would be linked to concrete examples in class. In such an approach, the student might be more or less active, but the teacher tends to act as the “knower” within the context of the content.

### **Student-oriented (“practical”) approach to teaching**

In contrast, Figure 1 shows a second approach to teaching, which reflects my later and current experience with teaching Innovation in Value Networks. This newer approach takes a more “practical” approach to teaching by using cases as the central topic in each class, supplemented by a few more academic readings. Interestingly, while the overall aim of the course remained the same (namely to teach students relevant concepts

and theories in the area of open and distributed innovation) the new approach is much more student-oriented as it strengthens the links between the content and the student. Such an approach has important implications for the pedagogical relation between the teacher and the student as the former now acts more as a facilitator to guide the students in their overall learning experience. As such, besides teaching the students about relevant concepts and theories, this approach also aims at improving their analytic and presentation skills.

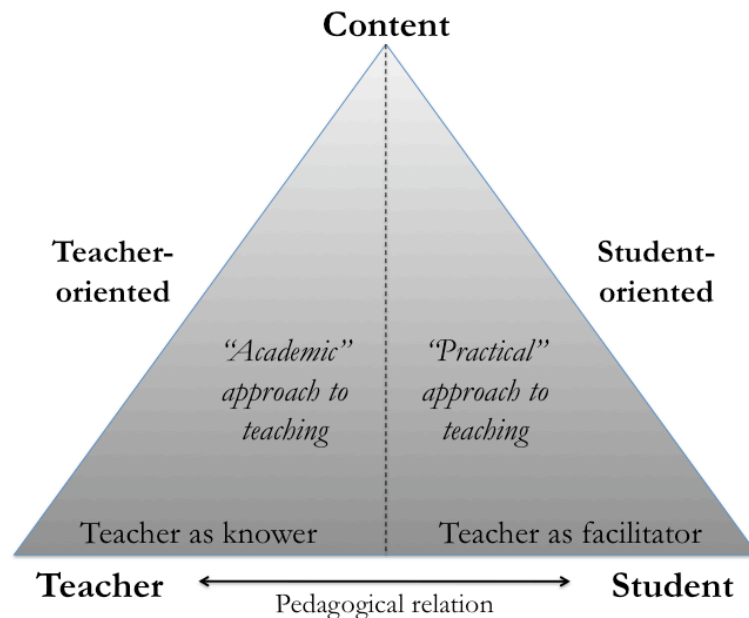


Figure 1. Teaching approaches in didactic triangle

As part of the attempt to make teaching in Innovation in Value Networks more student-oriented and more practical, I introduced another particular activity in one of the classes, namely the use of a game that reflects a number of relevant theories and practices related to open and distributed innovation. The aim of this game was to (a) help the students to better understand some concepts and theories within open innovation, (b) make them familiar with some practices related to open innovation, (c) promote positive interactions within the student groups, and (d) better understand how such a game can enable different types of learning at different levels.

## Using Games in Teaching and Learning

While games and play are deeply rooted in human beings as a way to learn and interact, games also fit into a more general theory of learning, as for example proposed by Illeris (2002, 2003) as they integrate internal (psychological) learning and external interaction with the social, cultural and material environment (cf. Lave & Wenger, 1991; Statler, Roos, & Victor, 2009). Moreover, as games have the potential to relate different types of knowledge (e.g. old and new knowledge) to create a more detailed understanding of the underlying issues and concepts (in contrast to only aiming at completing particular task requirements on the surface level), games are potentially conducive to deep rather than surface learning (Biggs, 1999; Biggs & Tang, 2007; Ramsden, 2003). Games furthermore allude to both the cognitive dimension of learning particular content and emotional dimension of mental energy, feelings and motivations, while it also relates to the social dimension of external interaction with the environment (e.g. participation, communication and co-operation) (Illeris, 2003).

In addition, games introduce activities into the lecture and promote student engagement (i.e. active learning), they allow students to go beyond individual work (i.e. collaborative learning), they introduce co-operation among the students (i.e. co-operative learning), and they address or solve the problem of what needs to be done to play the game, which thereby also leads to a better understanding of the concept of open collaborative innovation at large (i.e. problem-based learning) (Prince, 2004). More specifically, a game addressing open collaborative innovation and co-operation should be well in line with the fact that “the best available evidence suggests that faculty should structure their courses to promote collaborative and cooperative environments” (Prince, 2004: 7).

## A Case of Playing Open Innovation

Below, I first briefly review some main concepts and practices within open innovation. Subsequently, I give an overview of the game called “Crossroads” that I used in Innovation in Value Networks and I indicate how it was used as a tool to promote and study learning. And finally, I give some observations from the game experience, following by an analysis of some main results with regard to using this game and games in general to promote a more student-oriented approach to teaching.

### Some open innovation concepts and practices

Following Chesbrough (2003), open innovation is becoming increasingly important for firms as a way to use and recombine internal and external

knowledge to develop and commercialize valuable innovations (Bogers, 2011b; Bogers & West, 2010; Enkel, Gassmann, & Chesbrough, 2009). At its core, open innovation is about “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (Chesbrough, 2006: 1). A particular and increasingly important area within open innovation is the collaborative development of innovation by multiple organizations, which combines knowledge inflows and outflows (Bogers & West, 2010; Hagedoorn, 2002; Vanhaverbeke, 2006). This “coupled process” of open innovation “refers to co-creation with (mainly) complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success” (Enkel, et al., 2009: 313). As such, open innovation and the related area of inter-firm partnerships have grown tremendously (Dahlander & Gann, 2010; Hagedoorn, 2002).

When firms open up their boundaries to work together with other stakeholders, including their competitors, many strategic issues arise. In particular, the simultaneous cooperation and competition, also referred to as co-opetition, with other stakeholders within a value network both enables and constraints firms’ abilities to create and capture value through innovation (Afuah, 2009; Brandenburger & Nalebuff, 1996; Nalebuff & Brandenburger, 1997). Opening up firm boundaries in the context of collaborative innovation is a process that is active on different levels of the organization, ranging from the business model on a strategic level to the open innovation practices on the operational and individual/team level. In order to explore the role of individuals in collaborative knowledge creation processes, du Chatenier, et al. (2010) examine the competencies that professionals need for working in open innovation teams and to cope with the challenges they face. Their qualitative study reveals the importance of brokering solutions and being socially competent within a context that is inductive to knowledge creation, trust building and low reciprocal commitment within the open innovation.

### **Description of the “Crossroads” game**

The game is a board game for four players. Each player has nine pieces in a certain color, and each piece has a different point value, according to how difficult it is to connect the piece to other pieces. The more difficult a piece connects to other pieces, the higher the points of that piece. The group goal of the game is to build a construction on the game board together with the other players that is as big and valuable (points) as possible. On the other hand, each individual player has the goal to get rid of as many points (high point pieces are difficult to connect to) as possible to become the individual winner. Thus, the dilemma is to find a way to deal

with the conflicting individual and group interests in the group and in relation with the other players.

The game was used in the second class of Innovation in Value Network. In a class preceding the gaming class, the students were introduced to a case about open innovation that addressed challenges of collaboration and the dilemma of co-opetition. In the beginning of the gaming class there was a recap of basic open innovation concepts (including co-operation and competition, knowledge inflows and outflows, and incentives and motivations), and an introduction to the games (which was also found at prepared tables where the students could play in their group). There were three tables, each with four players, one also with an observer. As one of the (side) goals of playing the game was to create a common group feeling among the groups in which the students were working on other assignments (and as the game session was already held in the second class of the course), the groups were formed by the actual groups in which the students were working in the course at large.

The students played two rounds of the game. The first round was to get a feeling for the game and the second round was the one in which the students could win prizes. There was a prize for the individual winner (a book), and a prize for the best group (a copy of the game for each member of the group). In order to analyze what happened in the game session, each table was filmed to capture everything that happened during the entire game session. There was also a moveable camera that filmed the over-all room as well as particular events.

### **Results and discussion of the game's teaching effectiveness**

The playing of the game showed many interesting elements in terms of the students' behavior and reactions. More observations and analyses are available in Bogers and Sproedt (2011) but some basic observations are offered below, while a short analysis with particular relevance to how playing this game appeared to be an effective mechanism to teach students about certain concepts and practices that underlie particular elements of open innovation.

Some basic observations that caught interest while observing the students play the game and while analyzing the video material are as follows. The students were very active from the very beginning as they were grabbing, holding, exchanging and playing with the pieces (already during instructions before that actual game playing started). Interestingly, they were mostly discovering the rules while they were playing (which might be seen as a form of learning-by-doing). They were also actively discussing what happened and what to do during the game, with the second round involv-

ing much clearer strategies. Furthermore, they were sometimes physically moving pieces and adjusting or moving around the board. In some cases, they were doing such things by themselves but in many case they were also actively helping and supporting each other. While they were playing the game, the students moreover seemed to become more aware of the trade-off between individual and collective performance, which was indeed one of the objectives. As also in line with the objectives, the students were engaged in the discussion of concepts during the reflection and as such showed how the game taught them about certain open innovation concepts and practices.

The analysis moreover showed that the students learned about certain concepts and practices related to open innovation as they showed them in their behavior during the game or were able to express it in the reflection after the game (Bogers & Sproedt, 2011). In particular, the students showed a better understanding of co-opetition with particular reference to the balance between cooperation and competition. Another theme that emerged related to different ways of participating in an open innovation activity with an important role of for example power, control and trust. Moreover, the experience with the game revealed some more dynamic elements, as there was a development in knowledge boundaries, relationships and rules.

I now turn to the analysis and discussion the teaching effectiveness of the game played in Innovation in Value Networks. The aim of the game was to give the students an experience that enables deep learning rather than surface learning (cf. Biggs, 1999; Biggs & Tang, 2007; Kolb & Kolb, 2010; Ramsden, 2003). Table 1 provides an overview of different types of learning and the related results as identified through the analysis, with a representative example for each type.

In the analysis, it appeared that there was in fact limited evidence of surface learning as exemplified by the fact that there was very little emphasis on the actual (written) rules but that students rather preferred to get a detailed understanding of the underlying rules by playing and discussing the game. This was therefore an indication that deep learning was indeed present, which was shown by the fact that all students were very emerged in the game. Another piece of evidence in support of the occurrence of deep learning was the students relate what happens in the game to what they already know, for example from the theories and concepts I introduced in class or even from other courses they took before.

I moreover find evidence that the game engaged all three dimensions of learning as presented by Illeris (2002, 2003). Namely, the cognitive dimension develops as the students build an understanding of the game, the



<b>Type of learning</b>	<b>Result</b>	<b>Representative evidence</b>
Surface learning	Limited evidence	Little focus on and even an ignorance towards basic information (e.g. written rules)
Deep learning	Students show a deep understanding of the game itself and underlying principles	Students relate their experience to existing knowledge, including theoretical concepts from this and other courses (e.g. value creation and appropriation)
Cognitive dimension of learning particular content	Students build up an understanding of the game and are able to deal with the challenges of the game	Groups formulate a strategy of some sort to attempt to maximize the (mostly group) performance
Emotional dimension of mental energy, feelings and motivations	Most students develop a personal sensibility by securing a mental balance	Students showed clear motivations and feelings related to the collaboration, for example by not wanting to play the action cards
Social dimension of external interaction with the environment	Students integrate into their group “community” and to some extent into the whole class by participating, communicating and co-operating within the scope of the game	The game shows many instances of participation, communication and co-operation by the students, for example when they are moving the game around, when they are discussing which strategy to follow, or when they collectively ensure that the structure does not collapse

Table 1. Evidence of types of learning

emotional dimension is reflected in the feelings and motivations expressed by the student, and the participation, communication and co-operation by the students express the social dimension of external interaction with the environment. Table 1 gives a description of these types of learning and present some evidence as found in the case.

## **Conclusions and Challenges for the Future**

This chapter showed how a game fits into a student-oriented teaching approach as it enables deep learning (Biggs, 1999; Biggs & Tang, 2007; Ramsden, 2003) and addresses cognitive, emotional and social dimensions of learning (Illeris, 2002, 2003). Besides teaching students concept and practices related to open innovation, the game experience also showed that the use of a game helps students to learn and interact in a more playful way (cf. Kolb & Kolb, 2010; Roos, et al., 2004; Statler, et al., 2009). The game experience presented in this chapter in particular showed how playing a game can be an effective mechanism to teach students about certain concepts and practices that underlie particular elements of open innovation, thereby helping the students to better understand the theory and practice of open collaborative innovation (Chesbrough, 2003; Chesbrough, et al., 2006; du Chatenier, et al., 2010; Nalebuff & Brandenburger, 1997).

This experience clearly offers insights to teachers who could re-evaluate parts of their teaching approach by making it more student-oriented, for example by using cases or a game like the one discussed in this chapter. The approach discussed in this chapter however also provides a number of challenges. On the content side, the game shows that when people enter a collaborative effort that entails motivating a joint production (Lindenberg & Foss, 2011) and openness to external stakeholders (Bogers, 2011c; Laursen & Salter, 2006), they might be challenged to balance certain dimensions. For example, in the social interactions, most of the students avoided conflict in order to keep a good collaborative spirit, even though it appeared to be the only way to solve a particular problem. Thus, by observing the students' behavior in the open collaborative innovation game, this experience also revealed some caveats of playing open innovation. In particular, the trade-off between individual and collective incentives can be difficult to manage and even entail a paradox, while there were actually cases with apparently too much collaboration.

Moreover, on the teaching-side, this experience reveals some challenges, particularly related to how one's teaching approach relates to student learning. In this particular case, I moved from a teacher-oriented "academic" teaching approach to a more student-oriented "practical" teaching

approach. This way of activating the students however entails giving away some control as the students also share more responsibility for their own learning. In terms of the didactic triangle (see Figure 1), to improve the link between “student” and “content”, the “teacher” needs to be a facilitator rather than being in control the entire process. This chapter shows that similar challenges arise when using a game to teach open innovation, especially because during the play per se, the teacher is not much more than an observer as the student are the ones who play (and learn).

Other questions that remain open for future elaboration are the more general caveats and costs of open innovation, and how such a game can help to work with some of these issues conceptually and practically. More generally, it will be interesting to explore the broad and specific applicability of this game or other games in this and other settings. An important issue moreover is how one might effectively assess (the determinants of) the learning outcome with such a non-traditional approach, while issues of examination also become more relevant. A final set of issues that will be worthwhile to further explore are (a) how we can spur creativity, imagination and fun in teaching more generally, (b) how this approach can help to get more students to the classroom (and to our programs), and (c) how this might help to create better professionals or managers after the students graduate?

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