CORPORATE COOPERATION IN DESIGN EDUCATION IN LIGHT OF SITUATED LEARNING

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ABSTRACT
This paper explores how one can understand corporate cooperation as part of design education in the light of theory on situated learning. The origin for the study is a cooperative project between postgraduate students in Product Design and Lego. The students worked from a satellite office on campus on an open-innovation developing platform with Lego.

The suitability of problem-based learning and master-novice learning is compared to functioning in a community of practice and an open-innovation process, as most of the students have been subjected to these learning approaches in their former education.

The project presented some challenges to the students in relation to understanding their roles and assessing their performance. While reflecting on the project, the students recognized their limitations and suggested how the problems that arose could have been avoided.

As a consequence of this reflection, we suggest introducing cooperative projects on an open-innovation platform at the beginning of the BA rather than at the end of the MA. This would allow the student to comprehend his/her role as a designer and develop professional confidence earlier as well as to reach a higher level of understanding, cooperation and critical thinking. This opposed to learning by problem-based and master-novice pedagogical environments, which does not ensure the considering of the social relevance in design projects, acquisition of skills to perform in cross-functional teams, nor to equip students with the necessary skills to perform in a community of practice.

Keywords: Situated learning, Open Innovation, Problem-based learning, Master-novice learning

1 INTRODUCTION

The Product Design Education program at Oslo and Akershus University College of Applied Sciences (HIOA) has, as many other design education programs, much experience in running cooperative projects with industry players, a course-dimension believed to represent the *real world*. Since the inauguration of the master's program at HIOA in 2005, cooperation with external companies has been formalized in the study plan with a twelve-week, 20 ECTS weighted course in which students go to companies for practical placement.

The students attending have been previously exposed to both *individual* and *interactional pedagogical* views (see Figure 1) during their in-house BA study [1]. Hence, they have met both master-novice learning, which is based on knowledge- and skills transfer from one experienced person to several inexperienced others, and problem-based learning where students must choose the approach, skills, and methods, necessary in order to answer to the self-defined problem definition.

During the six first weeks of the second semester, some of the students complete the course Product Design, Psychology and Market (10 ECTS) working with Lego briefs. For the remaining twelve weeks of the semester, they complete their Practical Training (20 ECTS) with Lego from a satellite office at HIOA on an open-innovation (OI) developing platform with fellow students in other institutions and some designers at Lego. In this context, OI mostly represents an interactive organizational learning view, as teamwork is foremost in each project. Over the last two years, approximately one third of the master's students (15 in total) have completed this cooperative project with Lego.

Lego introduces a design brief at the beginning of the semester, which gives the students an understanding of the high expectations concerning work capacity and results. In order to motivate students and give them a clear understanding of what the project entails, they are invited to Billund to get insight into the development and production of the Lego toys. Accordingly, the students are

included in the design team at Billund, i.e., they get specific design briefs, regular tutoring, direction, and feedback from Lego.

During the course the students do engender concrete results and prototypes for testing and evaluation; nevertheless, the trend is that the design process lacks critical and conceptual thinking. Furthermore, the degree of creative self-efficacy, which can be explained as the belief in one's own ability to create, is low during the project [2].

This surprising trend inspired us to investigate possible underlying reasons through the research question, how can one understand corporate cooperation as a pedagogical learning environment in design education in the light of theory on situated learning?

2 METHOD

The empirical data in this study is based on student reports, interviews, and reflection notes from the two courses: Product Design, Psychology and Market (10 ECTS) and Practical Training (20 ECTS). The data analyzed is only from students who cooperated with Lego during these two courses.

We analyzed the empirical data via theories on situated learning and the four key terms coined by Etienne Wenger's [3] that explain *communities of practice* namely: Communities are not limited by formal structures, Address the tacit and dynamic aspects of knowledge, Links between learning and performance, Taking collective responsibility for managing the knowledge needed.

3 SITUATED LEARNING

Situated learning is concerned with everyday learning. Within this view, knowledge "is dynamically constructed as we conceive of what is happening to us" and, furthermore, our conception of our activity within a social network shapes how we think and act. [1] Accordingly, knowledge within situated learning is not an object, set of rules, facts, or descriptions, but rather a "capacity to coordinate and sequence behaviour to adapt to changing environments" [1] (see Figure 1, interactional view).

The situated learning view builds on Vygotskij's *zone of proximal development* (ZPD), i.e., that claim that students have more to gain through active participation in the learning experience. According to Vygotskij, ZPD is "the difference between what an individual can accomplish alone and the potential development through problem solving in collaboration with more capable peers." Accordingly, the "tools are the basis for carrying out the socially organized activity which, is, in turn, the basis for the development of new mental functioning and activity in the world." [4]

3.1 Communities of practice

The term *situated* does not refer to a physical place, rather a milieu where learning happens. These learning environments involve tools, methods, objects, and other factors, and possibly *capable peers*. Wenger refers to such learning environments as *communities of practice*. He states that knowledge is constructed while we live, act, and practice within a social network, influenced by one's own and others' activities. This stance resembles a social-constructivist worldview. [4-7] An action in this situation is controlled by a person's understanding of his or her place in a social process. [1]

Wenger describes practice as a "process, where we can experience the world and our engagement within it as meaningful." [3] Practitioners from a shared practice domain, who meet for discussions and activities out of sheer commitment, concern and interest, form communities of practice. In these communities they learn "how to do it better as they interact regularly." [8] Accordingly, communities of practice provide an active curriculum and a comprehensive learning environment in opposition to the traditional master-novice (MN) approach (see section 4.1). [1, 3] Lego serves as an example of a community of practice in the context at hand.

Wenger's characteristics of communities of practice partially make the categories for the analysis of the empirical data as follows:

- Communities of practice enable practitioners to *take collective responsibility for managing* the knowledge they need, recognizing that, given the proper structure, they are in the best position to do this
- Communities of practice create a direct *link between learning and performance*, because the same people participate in communities of practice as in teams and business units
- Practitioners can *address the tacit and dynamic aspects of knowledge* creation and sharing, as well as the more explicit aspects

Communities are *not limited by formal structures*: they create connections among people across organizational and geographic boundaries

	Knowledge is about	Knowledge resides in	Knowledge developed by
Individual view: Reify individual employee, an constant player moving in the corporation	Technical details of products and services (internal capacity)	Specialized employees (stored in individual heads)	Training given to individual
Interactional view: Reify company-customer relations as stable & responsive	Customer relations (interactive capacity)	Cross-functional team (manifest in activity)	Project activity of functional work-group and teams

Figure 1. Two different epistemological approaches towards organizational learning (W. J. Clancey, 1995)

4 ANALYSIS OF THE DIDACTICAL BASIS FOR THE PROJECT

The following section presents the different learning approaches that the students are exposed to during their education, namely problem-based learning (PBL), master-novice learning (MN), and the OI during the internship period.

4.1 The Master-novice learning approach

The traditional MN pedagogical view acknowledges that learning is the "reception of factual knowledge and information", where the master is the sole source for learning. [1, 3] Although we do not use this instructional system in our MA program, it is widely used during the first part of our BA program in Product Design. Typically, a professor would instruct the students via a demonstration about health, safety, and environmental activities associated with the use of the machine park, but also in the information on how to use specific techniques of production as part of a design process as well as in construction and design guidance. The MN learning approach compares to the individual view of learning (see Figure 1).

4.2 Problem based learning

PBL is used extensively on both our BA and MA programs. Although the students do not study the theoretical side of the PBL approach, they have experience with it through practice. The PBL approach is described by Walsh as "a pedagogical approach which uses cares and problems as a starting points for acquiring the desired learning objectives." [9]

PBL has been criticized for the various adulterated forms that emerge by subjective interpretations, dependency on large educator resources, feelings of frustration by the students, and questionable efficacy. [10]

The approach is mainly comparable with the interactional view (see Figure 1), but it can also be instructive in the sense that students can define what is relevant *cares* and *problems* on the basis of confined experiences and through influence by the tutor. Furthermore, there is no emphasis on the comprehension of the students' place in a social process as there is in the ZPD.

4.3 OI at Lego

Chesbrough describes OI as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and explain the market for external respectively. This paradigm assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advantage their technology." [11] The OI view rests on two kinds of understanding of the term "open". There is the "outside in", where a company makes greater use of external ideas and technologies, and the "inside out", where a company allows some of its own ideas, technologies, or processes to be used by other businesses. Chesbrough mentions Lego as "a striking example of "outside in" [11] innovation.

A different system for evaluating ideas has emerged in the outside-in openness scheme, namely the "wisdom of the crowd," [11] which was intensified in the Lego Group in 2004. Wisdom of crowd is a decision system where everyone involved in the process gets an equal amount of votes to use in the

selection of concepts, this to avoid self-interest to be a major reason for choice. Erik Legernes, senior creative director at Lego and contact person for the cooperation, believes in the wisdom of the crowd and stated that, "people who come from different disciplines provoke and challenge each other, which is a lot more fruitful than working with people who work the same way" [12].

5 DISCUSSION

5.1 Taking collective responsibility for managing the knowledge needed

As a general trend, the students enjoyed the OI process at Lego, which seemed to establish a safe working environment. As one student says,

> "Adults playing their way towards rough concept sketches accompanied with lots of laughter and fooling around was interesting. This is how I hoped and believed it would be. This work process opens for all kinds of wild ideas and nothing is too poor or silly to be presented."2

However, when confronted with this process and the people involved, the students left their own processes behind to some extent. They gathered most of the necessary information through Lego. Typically, the students did not challenge or take responsibility for managing the knowledge needed. As one student said, "I've done what Lego wanted me to do, and it has not always been consistent with my personal learning goals." Seemingly, the students did not work optimally with regard to representing themselves as challenging, capable peers. Furthermore, they had phases where they felt dispirited and not able to manage or understand their role in the network. This might have to do with problems in communication. As one student pointed out,

> "Challenges of communication occurred immediately with Billund [on Skype]…we did not see what they presented and we did not grasp everything that was said either, and after asking them to repeat several times it became embarrassing to ask for more repetitions, so we just let it pass. The result of this was that we became unsure of what we should be working with…and then we fell behind all the time."

The students identified the communication problems, but, considering the level of frustration and impact on the quality of their work, the effort invested to solve the problem was insufficient. For example, the students did not establish a system for documenting the meetings with Lego. However, they did take an initiative towards communicating their concepts to Lego through video, which was somewhat successful.

5.2 Links between learning and performance

The students did not feel they had the necessary skills to function in and as a cross-functional team in the community of practice. In the meetings with the employer, they tried to grasp the essence of Lego's instructions and requirements instead of exploring and searching for other methods, knowledge, and tools suitable for the project. Accordingly, feelings of self-efficacy were not strengthened during the project. On the contrary, the students felt incapable of working independently and waited for weekly guidance from Lego in order to continue their work.

After the project, however, a new understanding emerged. The students identified things they could have done differently. As one student noted,

> "I personally think that if we had taken the initiative and communicated the concepts that we really believed in, it would have given us a different kind of respect in relation to what we can offer. We were interested in the projects, but sometimes we just kept things to ourselves and stayed within the framework we were given."

Accordingly, in hindsight they identified that they lacked the understanding of the role they had in the community of practice and, furthermore, the lack of managing the necessary knowledge and learning in order to perform differently from any in-house team.

The students certainly felt that they learned the business side of design through the OI process. As one student said, "It has been an interesting process that has given me a wider understanding of how such an enormous corporate group works, and how one has to communicate in order to be heard." Furthermore, they recognized the importance of the quality of presentation within the scheme of wisdom of the crowd. As one student pointed out, in order to communicate an idea throughout the vast network within Lego, "a good idea is not better than the effort given at a presentation."

The students acknowledged the advantages and disadvantages of the OI process and found it demanding and rewarding. The process of working in groups across institutions was successful.

Curiously, it seems that the work across institutions worked better than among the students locally. As one student pointed out, "During some phases we spoke very little to each other and kept working *by ourselves*" and "none of the final concepts that we created were developed by only one person alone, it was always group work." Accordingly, it seems that even though they had problems working together, they managed to work in the OI community of practice.

5.3   Address the tacit and dynamic aspects of knowledge

The students made several models and prototypes. Curiously, they did not make use of the traditional laboratories where they normally make mock-ups and models; instead, they used existing Lego bricks or rapid prototyping, even though their reification skills mainly lie within manual work and not CAD. This may have been the case because they believed this was what was expected of them, as it is the process most often used by Lego. Accordingly, they developed very few concepts. Lego valued some of their concepts, but the low production and scant variation surprised the tutors and people involved.

5.4   Communities are not limited by formal structures

The students tested out concepts at the local primary school (a cooperation project established by the teachers). The students found this evaluation process fruitful, as one student mentioned, "I have learned a lot about the involvement of users as a part of the design process, and I see the value of testing out concepts on children."

Apart from this external activity, the students did not make any contact with external people in order to gain or map possible necessary knowledge during the project. Accordingly, no diverse community of capable peers was created and, consequently, no dynamic curriculum was developed beyond the one presented by the Lego group.

5.5   Learning in relation to PBL, MN, and OI

The aim of the PBL approach is to instil the skills of independent, critical, and holistic thinking. The students' experiences with OI incited some critical thoughts about PBL, OI, and the instructive dimension at Lego, as the following statement illustrates:

> "I like the workshop style of the Lego process. It is really effective. If you have an idea…instead of sitting at your desk for five hours drawing, you just directly build it. In school, it is more of a slow process because what we learn here is somewhat different. When we went to Lego, we were kind of surprised about the way they do things...in a better way."

Counter to being critical, the students were perhaps too fond and respectful of their supervisor at Lego in relation to learning and performance. As one student put it:

> "It was not necessarily what our supervisor said…as information that gave us insight to his and Lego's thoughts…but his questions and his immediate reaction during our presentation of concepts and models. They signalled a clear direction that the process should take. This had great value since we often have a 'too open approach' during our work with school projects, and in addition we don't have the same strict demands on the products."

Obviously, the full meaning of PBL had not been conveyed to the students. What they do see is that PBL can result in passivity rather than action and exploration as experienced with Lego and OI.

During the cooperation project, the students had access to knowledge available through open cross-disciplinary processes. Furthermore, Lego made it very clear that they evaluate concepts according to the wisdom of the crowd principle. Even though students sometimes felt like they were working alone, they also noted that no concept was developed by one person alone. On the contrary, the concepts were based on the curriculum of the capable peers and directed in a specific direction by the crowd.

In contrast to the OI, it is easy to execute the PBL approach without a dynamic curriculum defined by capable peers in a community of practice. Moreover, teachers influence the students' choices and hypotheses and confine the workspace by coincidental knowledge transfer, subjectivity, and ideology. Furthermore, students' interests also represent knowledge and experiences that are not necessarily representative of the current or future society. The knowledge, skills, and general competence that the students achieve through using this instructional system might therefore cause a gap in a more complex community of practice in terms of corporate cooperation and, in this case, OI. As one student notes, "I have learned that in real life projects, there are many more factors to evaluate, and changes may and will come. We, as designers, have to be prepared for these changes and open to taking new

challenges." The above-criticized facets of PBL compares to the MN learning approach and the individual pedagogical learning view (see figure 1).

6   FINAL REMARKS

The students did not feel they performed at their best during the cooperation project; rather they felt insecure and to some extent only did what they were told. Thus, it seems that they were not equipped to perform in a community of practice. Accordingly, one can say that the students had a limited understanding of their role in the social network that the cooperation constituted during the project. However, in the reflection notes, some students mentioned that they were aware that this was the case. Thus, the encounter with the community of practice at Lego made the students reflect on their own situation in relation to learning and performance in retrospect. Moreover, the students consider understanding, cooperation and critical thinking to be a competence. In a community of design practice, such competence would seem elementary.

It is therefore natural to assume that by giving students the chance to obtain such *basic* competence by introducing OI cooperation at the beginning of a BA rather than at the end of a MA education, they would obtain a comprehension of their own role as a designer and consequently their professional confidence will develop earlier. In this context, the role of the educator shifts from being a limited and subjective source of information to a facilitator for learning in practice. The industry, as a community of practice would then serve as a multifaceted environment and additional source for the consideration of a project's social relevance. The possible sharing of experiences among students during such a project, would serve to prevent the instruction of what relevant *cares* and *problems* might be, from the educator and industry. The demands of performance in an OI project will also contribute to the discussion of what basic design skills might be, as in the example in this paper, students were trained to perform in traditional material workshops and asked to perform in a milieu were ideation, cooperation, concept development, communication and networking are considered most important.

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