

# Collaboration between two innovation courses enhances students' understanding of organisational context

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## ABSTRACT

The present paper presents the results of an experiment of close collaboration between two courses at the fourth semester at the bachelor programme 'Process and Innovation' at Technical University of Denmark. The two courses are Innovation and Knowledge Management (IKM) and Innovation in an Organisation Context (P4). Design-based learning has been used as a learning philosophy in both courses. The two courses shared six hospital cases at Herlev/Gentofte Hospital in the Region of the Capital of Denmark. The aim of the collaboration was to emphasize the students understanding of the organizational context in order to generate more value for the case-partners. Initially the students conduct an in-depth organisational analysis of a hospital department in the IKM course, followed by problem definition and an innovative process in the P4 course. The case partners answered with some variation that they recognized that the groups had taken the context into consideration e.g. economic and organizational issues and that it led to a more comprehensive understanding of the problem they solved, and to value creation in the proposed solutions. For some of the case partners the value generation did not primarily come from the final solution but from the initial analysis and inspirational discussions between staff members about the organisational context and situations from daily practice at the hospital. As an additional finding, this led us to explore the concept of *premature closure* of the problem definition. We concluded, that our actual framing of *design based learning*, based on Design Thinking and Double Diamond do not address the problem of *premature closure*. Based on literature we suggest a re-interpretation of design-based learning with "design as a hermeneutic practice" as its core.

*Keywords* – Design-based learning, innovation and design process, problem and context analysis, premature closure

*Type of contribution:* Explore

*Questions for plenum:*

1. We argue that a deep understanding of the context is important for identifying the right problem and developing relevant solutions. How do you teach students about a context (user and/or organisational context)? To what extent do you equip students with theoretical concepts prior to their work in the organization?
2. Premature closure is a well-known concept in medicine and also mentioned in literature about creativity (e.g. the Torrance test). How do you experience the concept of premature closure when teaching innovation?

## I INTRODUCTION

In Open Innovation (Chesbrough 2006), it is widely accepted that the stakeholder's adoption of a new solution or a new value-offer is deeply dependent of the adoption to the actual context (Dopson et.al. 2008, Autio et.al. 2014). For the design engineer, getting the full picture not only from the perspective of users (von Hippel 2005) but also from multiple perspectives from other actors and stakeholders, analysing the organisational culture and ecosystem as a whole, is mandatory and maybe even a prerequisite for a

value creating solution. The more complex the case, the more the need of context understanding is emphasized. At the bachelor-program Process and Innovation (PI) at Technical University of Denmark, it is a cornerstone of the education is to teach the students how to conceive problems in their context, hence postponing the problem definition. Conceive is also the first step of the CDIO framework (Crawley et al 2007).

Engineers are often viewed as technical problem solvers (Downey 2005) and it is a challenge for some students to leave their aim to solve problems, and just immerse themselves into the organisational ecosystem characterized by interaction by many professions, intense activity, demands of high performance, power play, politics, human emotions and technology. Sometimes we see students and project groups closing their eyes for an ambiguous context, avoiding the complexity of the process, just jumping to the safe zone of solving a given problem. As Hansen and Jørgensen (2011) coins it “Problem identification is not a simple desk research task as it often involves a multitude of actors having different or even not very well established ideas of what might be a good design result”.

In the field of medicine, the phenomenon of jumping to conclusion too early, before all facts have been taken into consideration is labelled premature closure. Premature closure is also known from creative thinking, where it is mentioned in the Torrance Test (Almeida et al 2008) as a pitfall in creative thinking. Although, the label premature closure is not used in engineering design or innovation literature, we use it in this paper to denote the phenomenon of engineering students not maintaining the effort of exploring the context and incorporate the gained knowledge through out the whole process. Thus, they arrive at a premature problem definition that consequently leads to a solution that might not accommodate the full picture of the need of the users and other stakeholders.

To emphasize the importance of an understanding of the wider context we have at Process and Innovation made an experiment, and re-designed and integrated two fourth-semester courses. By the re-design and integration, we support the students’ exploration of the context of the particular case, before they define a problem and later develop solutions in an open design oriented innovation process.

The courses in the experiment are ‘Innovation and Knowledge Management’ (IKM) and ‘Innovation in an Organisational Context’ also called Project 4 (P4). Prior to the experiment the two courses were conducted in parallel throughout a semester, each with their own set of cases. Now IKM is executed in the first half of the semester, followed by P4. In the new design the courses share six hospital-cases, acquired through participation in the project CHI; Copenhagen Health Innovation (Link 2).

In IKM (5 ECTS) the students’ objective is to make a cultural analysis of the case’s organisational context. In the following course P4 (10 ECTS), the students must define a problem to solve and develop an innovative solution. In both courses, active learning is an integrated part that invites the students to learn and engage in theory, analysis and developing solutions.

## **II HYPOTHESIS**

We argue that when the courses aim at providing the students with a deep understanding of a complex organisational context it is more likely that the outcome of the innovation process can be implemented and will create value for the stakeholders in the case. We also argue that the exposure of the students to a complex reality in the setting of design-based learning, where students takes almost full responsibility for the interaction with the organization, supported by relevant theoretical concepts, do facilitate deep learning about innovation and the importance of adoption to context, theoretically and practically.

### III THEORETICAL TEACHING FRAMEWORK

The theme of this year's Etalee conference is active learning. In the two courses discussed in this paper, we use design-based learning to actively involve the students in their own learning process. Each of the two courses apply a different span of specific methods to support active learning. However, they do share the same case and the same student-teams throughout the semester. We define active learning as the students' active involvement with the organisational context and its actors and a design-based learning process that is also a design oriented innovation process, driven by students.

#### **Design-based learning**

The rationale for choosing a design-based learning framework is that it nurtures intrinsic motivation in the students and that it reminds very much of what the students will meet in real life when they graduate as Process and Innovation engineers. Design-based learning grows from problem-based and project-based learning, however, different emphasis is put on its content. Gómez Puente et al (2011) argue that the design of artefacts, systems and solutions in project-based settings are central, whereas Richard K. Miller (2014) (Link 1) argue that in design-based learning the problem have not been defined yet, thus the student needs to define the problem. Moreover, framing the problem is one of the most overlooked aspects of education according to Miller, which also corresponds to the claims of Hansen and Jørgensen (2011). It has therefore also been difficult to find papers exploring the problem definition aspect of design-based learning. The four central design-based learning elements applied in our two courses are: 1) Authentic cases, 2) Students work in project-teams, 3) Students follow a design based innovation process i.e. they iteratively investigate the context, define a problem and materialise a solution, 4) The teachers' dominant role is to act as facilitators and provide formative feedback. We will elaborate on the elements in the following.

##### *1) Authentic cases*

The concept of authentic learning was proposed by Herrington et al (2006) and relates to real-world situations involving complex problems and their solutions. Whittington et al (2017) argue that assignments with real-life relevance make students more motivated to learn and give them a more positive approach to their study. Working with authentic cases expose the students for real-world situations, it becomes meaningful for them to engage in the case, and it prepares them for their later professional careers.

##### *2) Students work in project-teams*

Design-based learning does not necessarily prescribe that the design process is conducted in a project-team, however, most design processes involve more actors. Working in project-teams also reassembles real life situations because this way of organising innovation in both the private and the public sector is widespread. In a project team, the members get familiar with the different development phases of a project team (Tuckman 1965). Furthermore, they need to cooperate, divide tasks between them and develop project management skills.

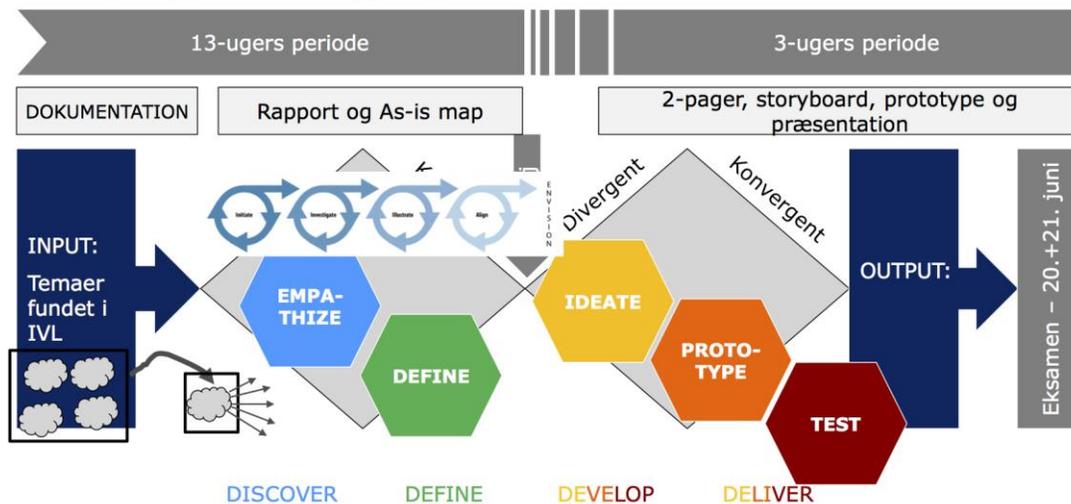
##### *3) Students follow a design process*

The students' objective of the P4 course is to conduct an innovation process. The students must "*analyse the company context, [...] identify and define a relevant problem [and] develop a solution*" as the course description explains (Link 4). At fourth semester students have experience with various innovation models presented at previous semesters. In P4, a merge of Design Thinking (Doorley et al 2018) and Double Diamond (The Design Councils 2005) is presented as a framework for the course-design and as a recommendation to the students, who have a lot of freedom to design a process appropriate for their particular case. See figure 1. Design Thinking methods with heavy focus on users and use context help the students design their data collection i.e. interviews, observation and workshops. The Double Diamond

makes the students aware whether they should diverge or converge in their work process. We set the restrain that a problem should be defined no later than three weeks before the final submission.



## Kursus proces og struktur



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Figure 1: The design process visualized at the first lecture at P4

#### 4) The teachers' dominant role is to act as facilitators and provide formative feedback

Puente et al (2015) argue, "The role of the teacher is to facilitate the learning process and coach and supervise students in DBL assignments". The teacher's task as a facilitator is also to take design for granted in design-based learning, to prevent premature closure, achieve a deep adoption to the context and to keep the wheel of the design-process spinning to gain knowledge all the way, until times is up.

As teachers, we need to prepare and support the students' entrance into the arena of the case. We must consider what is an appropriate theoretical toolbox, what process models should be suggested, and what deliveries or explications could facilitate the process. Furthermore, we need to manage the initial contact with the involved case-owners in the companies and set up and align expectations. Sometimes company management expect students to solve given problems from day one, so the case-owners also need to understand the importance of exploring the context and let the students take responsibility for the project.

## IV THE CONDUCTED EXPERIMENT

### Access to authentic cases

Access to the cases has been provided through the teachers' participation in CHI (Copenhagen Health Innovation), a project that aims to create collaboration between the healthcare sector and universities. Before semester start, CHI provided us access to hospital management at Herlev/Gentofte Hospital. We were allowed to contact all departments with an introduction letter sent by email. Six departments of 16 possible agreed to participate as case-partners.

## Learning design

The IKM course follows a strict lecture structure where the students at each class apply a theory (selected by the teacher) to analyse the case. Each lecture is structured as a workshop with a number of activities supporting active learning: Student presentation of curriculum, facilitated dialogue in class, team exercises and group presentation. After each lecture, the groups documented and collected their work in a portfolio. After six and a half weeks, all groups summarized their findings in a poster session, showing “a comprehensive image of the organisation”. A report reflecting on the impact of the theoretical concepts on the innovation process were submitted after 13 weeks and presented and defended at an individual oral exam.

Innovation in an Organisational Context is organised as a project’s course that alternates between pitches made by the student-teams and supervision. The starting point for Innovation in an Organisational Context (after 6.5 weeks) was the descriptions and analysis of the group's case made in Managing Innovation and Knowledge Management. For the final assessment the students handed in a report, an as-is map, a storyboard, and a two-page executive summary. At the final oral group exam, they also presented a prototype.

## V DATA COLLECTION

We have conducted five qualitative semi-structured interviews with representatives from five of the six involved hospital departments. Table 1 shows how many and who were present at the interview in each department, as well as the length of the interview. We did not get any interviews at Department F, however, the group working there have continued collaboration with the Department and is in this moment of writing working with employee driven innovation in the Department.

**Table 1 Overview of interviewees and interview duration**

| Department | Participants   | Length of interview |
|------------|--|---------------------|
| A          | Head of Department   | 35 min.             |
| B          | Head of Department and Head of Unit  | 55 min.             |
| C          | Head of Department   | 36 min.             |
| D          | Innovation consultant, employee 1 and employee 2                                     | 49 min.             |
| E          | Head of Department, Head of Unit 1, Head of Unit 2, Production manager, Area manager | 47 min.             |
| F          | No interview   |                     |

The interview guide was comprised of five overall themes of questions: 1) background information of the interviewees, 2) perceptions of the students’ behaviour in the department, 3) the students’ influence on the daily routines, 4) the chosen problem and solution, and 5) the collaboration between the hospital department, students and university. The interviews were conducted two month after both courses have ended, were audio-recorded and transcribed.

Our hypothesis is that by providing the students with a deep understanding of a complex organisational context it is more likely that the outcome of the innovation process can be implemented and will create

value for the stakeholders in the case. To operationalise and validate this hypothesis we have formulated three questions we will examine our empirical data with:

- Were the students seen as relevant actors by the organization?
- Were the students, from the perspective of the organisation, able to adapt to the actual context?
- Did the proposed solutions consider the context, and how did it affect the perceived value creation?

We have used these questions for analysing our interview transcripts, however reformulated them into three corresponding codes: 1) The interviewees' perception of the students, 2) the interviewees' perception of the students' investigation of the organisational context, and 3) the interviewees' perception of the proposed solutions and value creation for the department. Both authors read the transcripts, and noted the coding in separate work logs. Afterwards we created a shared document with empirical examples of each coding category and discussed the meaning of them.

In addition to the interviews, the authors have also observed the students throughout the semester including their mid-term pitches and presentations, supervision and exams. Furthermore we have read their final reports and assessed work-portfolios, prototypes, storyboards, graphical representation of the as-is situation (as-is map) and the executive summary. We also consider our own slides from the introduction lesson as data. However, we have not made a systematic analysis of this data. We thus mainly base this paper on the interview analysis. At the end of the semester, we also made an evaluation of the course together with the students about how they perceived the collaboration between the two semester courses and the sharing of cases. This data has neither been the primary data for this paper.

## **VI EMPIRICAL FINDINGS, ANALYSIS AND DISCUSSION**

In the following, we present the analysis of our empirical data in the four categories: "The students as actors"; "Adaption to the actual context"; "Solution and value creation" and "Additional finding: Closure in the design process" We will discuss alongside presenting the results and analysis.

### **The students as actors**

First of all, in general, the students behaved themselves and acted polite and respectful to everyone. The interviewees describe them among other things as "polite", "engaged", "structured" and "creative". They paid very well attention to the fact that they are invited into a world of others, and conscious about not to disturb more than necessary. They are "good ambassadors", as one stated, and with "a good approach to inquiring without being judgmental". We as teachers will not take the credit of our students' good behaviour, but just note that it seems that the students have acted appropriate facing the sudden experience of being in the intense and complex world of a hospital. We will not further discuss to what extend the initial introduction to healthcare at IKM and P4 have supported this.

We also got the feedback that the students appeared structured, were good at communicating with their contact-persons at the hospital as well as other employers, and good at presenting for the stakeholders during the process. The interviewees mentioned the inquiring attitude several times as a sign of real interest in understanding what was really going on. Although we and our contacts at the hospital were aware that the experiment would somehow be time consuming, the students were pushing the limits. Asked whether the time consumption was acceptable one answered; "That was okay, but you could not have asked for more".

Educating trainees from many different medical professions is an integrated part of the daily work at hospitals, and working with students is a well-known part of the daily routines. Having non-healthcare professionals such as engineer-students or business school students in the department is somehow

different: They do not take part in the daily routines, instead they observe, analyse and eventually propose solutions. Asked what can be expected from an engineer, one answered “a practical structured approach”. Answers to the question what could be expected from our students and from their participating as a case in the courses came out more differently: Some departments tried to prompt the students to work on a particular problem, others just wanted “a glance from outside” and apprised the explorative approach. In short: The students acted differently from what the departments are used to. They are perceived interdisciplinary, serious, explorative and structured. To let engineer students into the department takes resources, but in general, the effort pays off.

The analysis of our interview shows us that the students have made a good impression in the departments and they have made an effort to study the organisational context they have been placed in.

### **Adaption to the actual context**

We were curious about how the departments perceived the process. What was it like to be under the analytic lens? What was it like to participate in a design based innovation process, emphasizing a deep understanding of the organizational context?

In most of the departments, the analytic part was recognized as relevant and necessary. One department; Department D, does not have direct interaction with patients, but are instead supporting the rest of the hospital, and facilitating processes across the organization. Employees here are familiar with the organisational perspective, and found the students “analytic approach” and the initial “cultural screening” obvious. In contradiction to what we experienced in the other departments, the cross disciplinary perspective brought in by the students were not perceived as something that created new value, but although acknowledged as something of importance in order to facilitate changes and innovation in the hospital. Only, most of the matters of interest suggested by the students were rejected as something of a larger complexity that could not be dealt with within the limited span of time.

In Department A, the Head of Department claimed the right to control organisational explorations and was surprised to be object for an organisational analysis. “We do a lot of work with employee satisfaction and management assessment. If more analysis should be done, I would prefer to be in charge”, the Head of Department said. The perception is that “one cannot do a proper analysis in such a short time”. Later in the same interview a bad experience with students from a business school were revealed, where the students “not at all grasped what's going on”, apparently, “because they have not spent enough time on it”. We have no detailed knowledge about the particular example, or the methods and theory applied, but much later in the interview, the manager indicated that our students’ observations and application of theoretical concepts actual did build a sufficient understanding of the organisational context: "They tried to go beyond, to talk about economics and costs while developing a device".

In Department A, time spend on archiving biological samples is an important matter. The students suggested a registration system that uses cameras to automatically log paraffin blocks with tissue samples when archived. The matter was suggested by the students on a backdrop of ten weeks of presence at the department, and chosen by the manager as well as the porters in consensus at an event where the students presented more optional matters. The suggested solution was judged as very relevant, realistic, and affordable: “They had an eye on the economy”. Also, the manager elaborated on a situation in the process where the students proposed several matters to choose from and noticed, “both the hospital porters and I chose the same solution as such, so it was very good. Then they have somehow hit it”.

This analysis shows that the matter of understanding the organizational context, is perceived as important and accepted as something of value in the process, but to see it as an integrated part of the innovation process is somehow new. It emphasizes the need of methodological alignment prior the cooperation.

## Solutions and value creation

In the table 2, we have listed the concrete results achieved in each of the participating departments. We have included Department F, even though we do not have any interviews with them. The quoted descriptions in the table refer to the “executive summary” submitted by the students to the departments at the end of the project.

**Table 2 Overview of the proposed solutions in each of the six departments.**

| Department | Proposed solutions and experienced value creation   |
|------------|---|
| A          | <p>“Real Time Tracker: A registration system that uses cameras for automatically logging paraffin blocks with tissue samples when archived.”</p> <p>The solution proposal is now part of the department's project pipeline, but second in line compare to other projects, e.g. an internal construction project.</p>  |
| B          | <p>“Digitized Registration of Substrate Samples”</p> <p>The head of department support the proposal: "I have given a green light [...] with the estimated economy we would really like to use the product that was presented". The group have formed a start up company and wish to continue the project as a supplier. No progress has taken place since hand in of the project report.</p>  |
| C          | <p>"SafeHeat": A new concept for the mattress for the operation table with built-in electric heating. According to the department manager, the proposed solution is relevant, well communicated, at it will create value if implemented, but realization will require involvement an external partner from the industry. Therefore, realization is not realistic.</p>   |
| D          | <p>“Notification System for Special Patient Meetings”: The yield is better patient treatment and better collaboration between departments and the department D during the implementation of a new concept for patient meetings.</p> <p>The notification system requires a change in the regional digital healthcare platform, called ‘Sundheds Platformen’, a complex and notoriously buggy and time-consuming system still under implementation. Involvement of the hospital's IT department is imperative. Realization is not considered realistic.</p> |
| E          | <p>"Timesaver” A collection of proposals for streamlining food delivery by optimizing the use of elevators for employee and visitors.</p> <p>Several suggestions have been implemented. Others are in progress. The effect is measurable. There are now fewer delays in food delivery, compared to a registration in December 2017.</p>   |
| F          | <p>“Flow Guide: A digital tool that helps employees to navigate in organizational processes and connect with the right departments in connection with project start-ups”.</p> <p>The collaboration between the group and the department continues in the form of a new project where the students are experimenting with employee-driven innovation.</p>  |

The list shows proposed solutions from six departments, where as we have conducted interviews in all but (F). Summarized one proposal (B) has led to measurable value creation. In two cases (A and C) the departments find the proposals feasible, they are willing to invest some limited economy in the finishing and implementation but no steps have been taken since end of the course. In two cases (D and E) the departments do not consider realization realistic. In the last case (F) the department manager agreed to let the students try to realize their proposal and a new project was formed. The scope of the new project is not

to implement the developed solution, rather to do experiments and gain new knowledge about the conditions for employer driven innovation in the department.

Value creation in an organization is not only measured on how likely a solution is to be implemented. In some departments value generation did not primarily come from the final solution but from the initial analysis and inspirational discussions between staff members about the organisational context and situations from daily practice at the hospital.

In Department E the students presented a solution to optimize the complex matter of food supply and transportation at the hospital, suggesting a range of hands-on interventions, some approaching the matter with communication techniques and strategies, other with simple tracking technologies, addressing employees as well as visitors. During the process, the students had a lot of interaction with the organisation, not only by observing but also by doing experiments. At our interview, the top manager as well as four middle managers had decided to participate and spent time. They have had a good experience working with the students, and recognized that the students' work did create value. The students were perceived as an important resource to deal with problems, that was well known, but not taken care of because of lack of resources, and because "people has got a little exhausted [and] there were a sense of discouragement". Our respondents felt inspired by the methods and the mind-set of the students and one felt that "now, the organization is more mature". Some of the concepts suggested by the students are already implemented and the outcome can be measured: "There are fewer delays than there has been in December, so it's only on a fraction now, where there are delays". Dealing with delayed food supply has, as we were explained, a huge economical impact, since delayed food to patients causes delayed operations. As one from the departments put it; "Never before I had anyone from outside looking at what's going on in the department from a technical, organisational or psychological perspective. That is new to us [and] it is my impression they had a very good understanding that is, whatever the case is, it doesn't take a quick-fix, it's more complex". Another said: "There are many actors and many dependencies so it became a really complex task [...] but they had actually identified the complexity." "The solution was very simple" one said during one of the interviews. This could be true to most of the feedback we got on the suggested solutions.

In Department B, the solution was well received when presented in the department: "People were amazed when the students presented the program they had made where the employees themselves were allowed to scan the things with these barcodes, and they could see how it just came online. There they were very excited". The project was intended to continue with the students as suppliers to the department, as they have formed a start-up. Although, as we speak, no action has been taken to realize the solution. It seems to be difficult to advance without the official framework provided by the courses.

In Department D, a consultant put it this way: "We ourselves had been around a lot of it". Later when the students' value creation was discussed in the interview, it was stated that: "basically, there was not much of a result". But, to deeper understand the culture and cross organisational praxis of the department, the students were assigned to two particular employees, former nurses, now consultants, and joined them at two minor change management projects, where the aim was to implement new tools and procedures. For the students it was an eye opener to experience how the consultants worked, how they were perceived in the departments where the implementation were meant to take place, and all the difficulties they met. The students ended up suggesting a very simple solution to notify the health care professionals prior to a specific kind of patient dialogue meetings. Both in Department D and in the department where it was meant to be implemented, it was appraised as simple and relevant, as "They had some really nice ideas", but hence conceptual strong, the proposal was also "rather unrealistic". Unfortunately, it conflicted with IT protocols and regulation. Although the students did not match the level of understanding of the context in the department, some organisational learning took place; "...we became even more aware of the importance of the fact that there is a professional knowledge and how the network is important".

One could argue, that even in the cases where the proposed solution did not create value, focus on exploring and understanding the context was not the problem. Rather the case is that the global context of

a hospital is overwhelming and constantly expanding, as you work your way in, so, if a value creating proposal should be developed, diving into the context of the IT-infrastructure is just the next step. Defining what problem to solve beforehand would be a premature closure.

### **Additional finding: Closure in the design process**

The fact that the experienced value creation in the six departments is very different leads us to question whether the process of the six groups has been different to the same extent. To exemplify, in case D, where a measurable result was achieved, the group did a lot of experiments and interventions in the departments, all along the process, and in the end their proposals were about organizing and communicating primarily with the means of physical signs in the department. In case C, the group chose the operation table with built-in electric heating as their scope. We do not have data to tell at what point in the process, the scope was decided on, but it directed the group into a product development process that did lead to a result that could only be applied with a comprehensive development process, substantial resources and the involvement of external industrial actors.

It draws our attention to the design based learning framework, as it was communicated with the Double Diamond model and the Design thinking model merged in one visualization (Figure 1), and to ask if it has provided the groups with an appropriate theoretical support.

Since the general learning strategy of the two courses is design-based learning, and the two innovation models both exemplify innovation processes based on design, we find it relevant briefly to discuss the concept of design and the design process in relation to premature closure.

The Design Thinking model as well as the Double Diamond model emphasizes the importance of knowledge creation early in the process. The first phase of design thinking is named 'empathize' and the double diamond the process starts out with a 'discover'-phase, similar to the 'conceive' phase from the CDIO standards for engineering education (Crawley 2007). Unfortunately, this does not necessarily prevent premature closure. Both in the case of design thinking and the double diamond, the second phase is named 'define', a term that can lead the less experienced student to the misconception that 'define' means that exploration of the context has been sufficient and thereby is 'closed'.

Looking back in literature to understand the basics of design processes reveals that learning theory and design theory are intertwined. In 1984, Kolb published his model for experiential learning; the hermeneutic learning circle. The year before, Donald Schön (1983) published the book 'The Reflective Practitioner'. Both are influential to modern learning theory, also experience-based learning and in particular design-based learning. Both are dealing with the same matter, that is, the emergence of something; knowledge, skills, concepts or 'solutions' in a process of experimenting or 'making', altering with reflection. In the perspective of Kolb and Schön the design process could be understood as a situated knowledge-producing hermeneutic practice (Jahnke 2013). Bryan Lawson, architect and design theorist, published in 2005 a hermeneutic model for the design process suggesting three actions; analysis, synthesis and evaluation, altering repeatedly with the duality of 'problem' and 'solution' as the pivot. According to Schön and consistent with the concept of design-based learning; "there are no problems to be solved, only problematic situations to engage in, characterized by uncertainty, disorder and indeterminacy" (Schön 1983 p 15), because, as Lawson adds; "Problem and solution emerge together" (Lawson 2006). A suggested solution is no more than temporarily stabilized - or closed - state, action, routine or artefact.

With the basic design process defined as a situated knowledge-producing hermeneutic practice, the Design Thinking model and the Double Diamond model will be '2. order models', that could help the practitioners (e.g. the students) to focus and organize their effort along the design process. But there is a risk, that the models can draw attention from the core of the process that is the emerging problem and solution, and the need for deeper knowledge about an expanding context that arises in the process.

In figure 1 the hermeneutic design process is hinted with four small circular icons shown below the textbox; “Rapport og As-is map”. As a consequence of our reflections in this paper, and to prevent the premature closure, we aim to emphasise “design as a hermeneutic practice” in the new learning design and the way it is communicated.

## VII CONCLUSIONS

Since we cannot compare our data from the semester in question with previous semesters (because we do not have interviews from previous semesters’ case-owners) we cannot conclude that the collaboration between the two courses have enhanced the students’ understanding of the organisational context compared with previous semesters. However, our study do show that all of the student teams have made a great effort to investigate the context and that both the case-owners and the teachers and examiner had the perception that the students understood the context they engaged in really well.

We conclude that the emphasized focus on understanding of the context have made sense to the students and also have paid off with respect to the departments experienced value creation. Our data and analysis indicate that design based learning is a relevant framework to stage a deep understanding of context. However, our additional finding indicate that the particular framing of design based learning with the use of the Double Diamond and Design Thinking visualized as one image (figure 1) in combination and the project teams extended autonomy to their own interpretation of the design process have not provided the students with the optimal theoretical support. In our future learning design, we will experiment with a hermeneutic oriented design framework, communicated in a more stringent fashion.

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## **INTERNET RESOURCES**

- Link1: Richard K. Miller (2014), Olin College [https://www.youtube.com/watch?v=yzM9\\_DamVP0](https://www.youtube.com/watch?v=yzM9_DamVP0), accessed 2 Oct. 2018
- Link 2: Copenhagen Health Innovation: <http://copenhagenhealthinnovation.dk/>, accessed 12 Oct. 2018
- Link 3: Knowledge and Innovation Management: <http://kurser.dtu.dk/course/62L26> accessed 12 Oct. 2018
- Link 4: Project 4: Innovation in an organisational context: <http://kurser.dtu.dk/course/62040> accessed 12 Oct. 2018

## **BIOGRAPHICAL INFORMATION**

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