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THE LEARNING POTENTIALS AND CHALLENGES WHEN INTEGRATING WEB 2.0

IN A PROBLEM-BASED LEARNING APPROACH

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THE LEARNING POTENTIALS AND CHALLENGES WHEN INTEGRATING WEB 2.0

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Part 1

by

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Dissertation submitted 2015

CV

Lillian Buus received her Master in Human Centred Informatics from Aalborg University in 2001. Later she was teaching and developing e-learning environments at an adult centre. In 2002 she obtained a position as research assistant in the e-Learning Lab (eLL) – Center for User Driven Innovation, Learning and Design at Aalborg University (AAU), dealing among other things with facilitation in virtual learning environments (VLE) and looking at alternative ways to make people collaborate and learn within groups. She also worked as assistant project manager on different EU projects dealing with e-learning and pedagogical issues.

In 2007 she obtained a position at the e-Learning Cooperative Unit (ELSA) at AAU, where she was put in charge of designing and implementing e-learning platforms and participating in projects dealing with Information and Communication Technology (ICT) and learning, e-learning and different platforms supporting learning. In 2013 ELSA became part of IT Services at AAU.

Lillian Buus started as a part-time PhD student at the Department of Communication and Psychology at Aalborg University in 2009. In connection with her PhD she is affiliated to the e-Learning Lab (eLL) – Center for User Driven Innovation, Learning and Design. Furthermore, she is still affiliated to the IT Services department of Applied Technology and Development, conducting implementation and development projects within the area of e-learning and virtual learning environments.

Her research interests are in the field of Learning Design, Computer-supported Collaborative Learning (CSCL), and Learning Science. She publishes in national and international journals within the areas of "Technology Enhanced Learning", "Networked learning", "ICT", "Social Media and Learning" and "e-Learning".

In her PhD dissertation, she used action research to study how teacher can integrate Web 2.0 and social media in their teaching practice, and how to scaffold this kind of technology integration.

ENGLISH SUMMARY

In my dissertation I investigate the learning potentials and challenges teachers face when they integrate Web 2.0-mediated learning activities into their teaching practice. I furthermore enhance a collaborative learning design method to scaffold teachers in this integration, because my research shows a need for pedagogical and technological scaffolding of teachers when they incorporate Web 2.0-mediated activities and technologies.

My research makes a triple co-construction between problem-based learning (PBL), learning design and action research within the area of networked learning. The complexity this creates in my research can lead it in many different directions, because it builds on collaboration, interaction and "elements" in motion. My assumption is built on the perspective that knowledge is constructed in social collaborative interactions between people. Furthermore, I claim that the ideology of Web 2.0 provides research opportunities to study phenomena also found in PBL and networked learning such as *student-centred (user-generated) content*, *active participation (creating)*, *interaction*, *(social) networking*, *knowledge sharing*, and *collaborating and cooperating in a social context*.

Based on the findings in my research, my claim has proved to be valid. I present different learning potentials, which show that this combination of Web 2.0, PBL and networked learning is able to develop and enhance students' different skills and competences supporting the ideology within the two areas of pedagogy. Besides the learning potentials, I present challenges or tensions, which can be seen as points of awareness in integrating Web 2.0-mediated learning activities and technology. These can be seen at different organisational levels.

My research furthermore shows that there is a need to organise some kind of organisational support unit to scaffold and facilitate teachers' design and implement their learning design. And it is important as the "scaffolder" to have competences within the area of pedagogy and technology and keep in mind the philosophy:

> *"We cannot design learning we can only design* **for** *learning"*

> *(Dirckinck-Holmfeld & Jones, 2009, p. 277)*

DANSK RESUME

I min afhandling undersøger jeg de læringsmæssige potentialer og udfordringer lærerne står overfor, når de integrerer Web 2.0 medieret læring aktiviteter i deres undervisningspraksis. Mit metodiske udgangspunkt er baseret på videre bearbejdning af en metode indenfor kollaborativ læringsdesign (CoED) til at understøtte underviserne i denne integration. Min forskning viser at undervisere har et behov for kombinationen af pædagogisk og teknologisk understøttelse, når de implementerer Web 2.0 medierede lærings aktiviteter og teknologier.

Min forskning kan siges at være en tredelt co-konstruktion mellem problem baseret læring (PBL), læringsdesign og aktions forskning inden for området 'networked learning'. Denne kombination skaber en kompleksitet i min forskning, som kan føre forskningen i mange forskellige retninger. PBL kræver kollaboration og interaktion mellem deltagerne og bl.a. dette fænomen undersøger jeg ved at bruge to metoder der også hver især rummer kollaboration og interaktion. Derved danner min forskning grundlag for at undersøge elementer der hele tiden er i bevægelse i forhold til sig selv og hinanden ud fra en erkendelse af at viden konstrueres i sociale kollaborative interaktioner mellem mennesker.

Jeg hævder, at ideologien bag Web 2.0 giver forsknings muligheder i forhold til at studere fænomener som også findes i PBL og 'networked learning' læring som studenter-centreret (brugergenereret indhold), aktiv deltagelse (skabende), interaktion, (social) networking , videndeling og samarbejde i en social kontekst.

Baseret på resultaterne i min forskning har min påstand vist sig at være valid. Jeg præsenterer forskellige læringsmæssige potentialer, som bl.a. viser at kombinationen af Web 2.0, PBL og 'networked learning' er i stand til at udvikle og forbedre studerendes forskellige færdigheder og kompetencer, og som samtidig støtter ideologien indenfor de to pædagogiske retninger. Udover lærings potentialer præsenterer jeg forskellige udfordringer, som er områder der kræver overvejelser i forhold til at implementere Web 2.0 medierede læringsaktiviteter og teknologier. Disse kan ses på forskellige organisatoriske niveauer.

Min forskning viser desuden, at der er et behov for at etablere en eller anden form for organisatorisk enhed af facilitatorer til at understøtte undervisernes udvikling og implementering af deres læringsdesign i praksis. Det er vigtigt at facilitatorerne både har pædagogiske og tekniske kompetencer og samtidig har filosofien for øje:

> *"We cannot design learning we can only design* **for** *learning"*
>
> *(Dirckinck-Holmfeld & Jones, 2009, p. 277)*

ACKNOWLEDGEMENTS

First I would like to thank Michael Collin and Lone Dirckinck-Holmfeld for believing in me as a strategic investment in the area of ICT, learning and PBL, which was the foundation for starting my PhD as part of the e-Learning Cooperative Unit (ELSA) within the area of Humanities. I am also grateful to the teachers that participated in my research – without your participation I would have no data. It was great collaborating with you and having the chance to facilitate your ideas for activities within Web 2.0-mediated learning.

I would also like to acknowledge my supervisor, Tom Nyvang, who has shown a lot of trust in my work and been an inspiration by questioning me from new or different angles, discussing theory, methods and structure with me and making me reflect upon my research to make it clearer. Thank you for your concern about giving me the time to do the research and write the dissertation in my double life as both IT consultant in IT Services (ITS) and PhD student at the e-Learning Lab – Center for User Driven Innovation, Learning and Design (eLL) at the Department of Communication and Psychology, Aalborg University.

I am so grateful to have a huge network within the university, and I have really appreciated all the support, discussion and inspiration you have given me. All of my colleagues from ELSA, eLL and ITS have been important to me in this period in different ways. Also, having the opportunity to participate in eLL's PhD Club was a great experience. To all of you in my network I would like you to know that I have appreciated our different discussions, sharing of knowledge, your great inspiration, the social life combined with the academic life, and the collaborative writing we have done, but I also value your time spent listening to and supporting me during this part of my academic life.

I have the deepest respect for and wish to acknowledge my dear colleagues and academic friends with whom I have collaborated in different projects contributing to this research and with whom I have written articles. You have been of great inspiration to me, and I have really enjoyed collaborating with you, and hopefully this will also be possible in the future. Also, thanks to Marie Glasemann with whom I spent a whole week in a summerhouse focusing on both of our PhDs. It was good fun and inspiring with all our discussions on various aspects of life.

Thanks to Ellen Christiansen, eLL, for inviting me to participate in the ScandLE network, a network embracing interesting people within the field of PBL. In this network I found inspiration for my research, and I had the opportunity to communicate the process of my research according to the book chapter on *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"* that I wrote with Nina Bonderup Dohn, Associate prof. at the University of Southern

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CHAPTER 1.

1.1. MY JOURNEY TO BECOMING A PHD

My inspiration for becoming a PhD student was based on experiences in both my work with the e-Learning Cooperative Unit (ELSA[1]) as an e-learning consultant, and my involvement with an international European Union (EU) project, in collaboration with colleagues from the e-Leaning Lab – Center for User Driven Innovation, Learning and Design (eLL). My journey as a PhD student was investigative, inspiring and instructive.

In 2008 the Faculty of Social Science at Aalborg University (AAU) began using an e-learning platform in their Entry term. This implementation project was also, in many ways, the starting point for this dissertation. In the period from 2009 to 2011 the AAU management also had, among other areas of focus, a particular interest in focusing on:

> *"Developing problem-based learning regarding information and communication technology (ICT) and e-learning in correlation with interdisciplinary activities."*
>
> *(Gylstorff et al., 2009) – author translation*

A report was produced based on this objective, defining four focus areas: "1) A shared e-learning toolbox at AAU, 2) Diffusion and sharing of knowledge about the pedagogical application of ICT, 3) ICT and pedagogical innovation, and 4) the development of pedagogical ICT competency" (Gylstorff et al., 2009).

In 2009 I was working at ELSA and was deeply involved in the implementation project at the Faculty of Social Science, which intended to implement Moodle[2] as an e-learning platform. Article I, *"From Website to Moodle in a Blended Learning Context"*, describes in more detail the e-learning platform, the implementation process, the considerations made and the lessons learnt. During the implementation project I realised that there was an interest in working more intensively with teachers regarding their interest in integrating information and communication technology (ICT) into their teaching. At the same time, the notion of social media

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[1] In Danish this is an acronym for "E-LæringsSamarbejdet". ELSA was established in 2006 as a cross-faculty unit, but organisationally embedded in the IT Department in the Faculty of Humanities.

[2] Moodle = Modular Object-Oriented Dynamic Learning Environment (Wikipedia, 2014a) – https://docs.moodle.org/27/en/About_Moodle_FAQ#What_is_Moodle.3F

and Web 2.0 technologies was evolving across the world. I found that in the Moodle e-learning platform there were opportunities to work with Web 2.0 technologies. This would be a new way to deal with the e-learning platform, but also an opportunity to look at the pedagogical approach, and it could also be a way for teachers to gain a qualification in the use of ICT in their teaching. I became interested in participating in the evolution of ICT and the Web 2.0 as seen from the pedagogical perspective used at AAU, and in working further with teachers to help them integrate Web 2.0 into their teaching practice.

Together with the Faculty of Humanities and the ICT Department within Humanities it was agreed that I would be "a strategic investment" within the e-Learning Cooperative Unit, and I was to write a dissertation in the area of Web 2.0 and problem-based learning (PBL). I was consequently enrolled into the PhD programme in Human Centred Communication and Informatics (HCCI) and I joined the e-Learning Lab (eLL) – Center for User Driven Innovation, Learning and Design as the base for my research environment.

My PhD was also partly founded in another project: *"Innovative Enterprise Architecture Education and Training Based on Web 2.0 Technologies"* (EATrain2). This project was established in 2009 as an EU project managed by the University of Macedonia, Greece, with partners from Germany, Austria, Poland, Ireland and Denmark. The project constitutes four work packages (WPs). Aalborg University established a project group with people from eLL[3], who were given the responsibility for developing WP2 and delivering a report on:

> *"An innovative, EA active, problem-based learning methodology [...] that capitalises on the principles of Web 2.0 and the related technologies, e.g. social networking, blogs, wikis and the like. This methodology will capitalise on the EA learning ontology to identify and address learning needs."*
>
> *(Noulas, Tarabanis, Tambouris & Peristeras, 2008)*

The EATrain2 project created the opportunity to work with a literature review within this area of Web 2.0, and the methodology used in the project was adopted and elaborated upon for the purposes of my PhD. The work in this project is described in more detail in a collection of articles presenting theoretical discussions, tensions identified in Web 2.0 educational settings, and the description of a methodological design framework developed in correlation with the integration of Web 2.0-mediated learning within enterprise architecture (Buus, Georgsen, Ryberg,

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[3] The project group consisted of people working with problem-based learning and ICT. The people involved were: Thomas Ryberg, Marianne Georgsen, Lillian Buus, Louise Nørgaard Glud and Jacob Davidsen.

Glud & Davidsen, 2010; Glud, Buus, Ryberg, Georgsen & Davidsen, 2010; Ryberg, 2013; Ryberg, Glud, Buus & Georgsen, 2010; Tambouris et al., 2012).

This project, together with the Moodle implementation project at the Faculty of Social Science, provided a way for me to become a part-time PhD candidate combining my work in the E-Learning Cooperative Unit and my PhD studies investigating the integration of Web 2.0 mediated learning in a PBL context.

1.2. WHERE MY RESEARCH INTEREST TOOK ME

With my PhD project, my intention was to study how Web 2.0 can be integrated into higher education (HE), and to look at the relationship between learning and the use of Web 2.0 technologies, using a Web 2.0-mediated learning approach. In this next section I will explain why I undertook research in this area and draw parallels between learning, PBL and Web 2.0. I will focus my research on learning potential from a teacher's perspective when they integrates Web 2.0 into their teaching practice.

More specifically I will take an approach to PBL that defines the mandatory pedagogy at AAU called "The Aalborg PBL Model" (Barge, 2010; Dirckinck-Holmfeld, 2002; Anette Kolmos, Fink, & Krogh, 2004). When establishing the AAU in 1974, a redeveloped approach to the traditional PBL had already emerged, and the ideals in this involved providing students with an active, participative role, and high degree of engagement in the creation of knowledge, both in lectures and as part of group-based project work (Barge, 2010).

Each semester students collaborate for 50% of their study time on writing a project report within a termly theme based on hypothesis, wondering or an eagerness to examine "problems" in the world. This project-based way of working has been described very well in a number of articles (Buus, 2012; Dirckinck-Holmfeld, 2002; Khalid, Rongbutsri, & Buus, 2012; Anette Kolmos et al., 2004; Ryberg et al., 2010), and it is further described in a paper I wrote in collaboration with two fellow PhD students, where we additionally identified the use of Web 2.0-based tools in supporting these kinds of PBL activities among students at AAU (Khalid et al., 2012). In parallel with the project work is the course work, and the other 50% of student work is based on both project- and study-related courses.
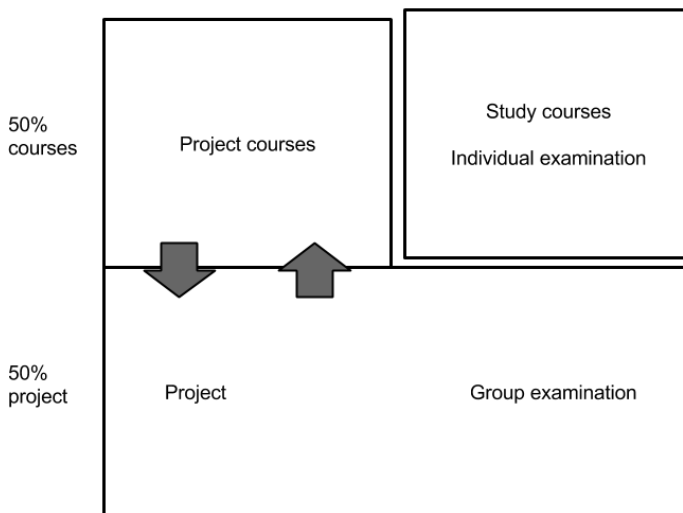
Figure 1: The traditional Aalborg PBL model taken from Anette Kolmos et al., (2004, p. 14).

Another important identification borrowed from the Aalborg PBL model is the role of the teacher in the AAU pedagogical model. Their role is based on facilitation, initiation, mentoring and peer learning rather than communicating and transferring knowledge (Barge, 2010; Dirckinck-Holmfeld & Buus, 2003). In 2010, Barge (2010) identified and described nine principles[4] that define the combined key dimensions of AAU's pedagogical model in practice. Within these principles were terms such as "integration of theory and practice", "team-based approach", "participant direction", "collaboration" and "feedback". Connecting with external organisations is beneficial to both AAU in general and to the students' real-life awareness. I am aware that there is a revision of the AAU PBL principles initiated by the PBL Academy in their annual report from 2013 (Holgaard, Laursen, Ryberg & Stentoft, 2013), and in 2014 a strategic project was initiated where "PBL – next generation" at AAU will be identified. I will return to, and elaborate on, PBL in Chapter 3.

From the literature review and participation in the implementation and EATrain2 projects I found that there was a kind of parallel between PBL and the Web 2.0 ideology. Some of the terms that define Web 2.0 are "participation", "dialogue", "user-generated content", "social networking", "collaborative editing", "blogging" and "social bookmarking". It is often the technology and functionality that is in

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[4] The nine principles are: educational vision, curriculum, students, faculty, assessment, resources, programme administration, external relations and educational research.

focus, but there must also be a focus on the way in which it is used (Anderson, 2007; Dalsgaard, 2005; Dalsgaard & Korsgaard Sorensen, 2008; O'Reilly, 2005).

> *"A Web 2.0 site allows its users to interact with other users or to change website content, in contrast to non-interactive websites where users are limited to the passive viewing of information that is provided to them."*

> *(Wikipedia, 2009)*

Dohn (2009, p. 345) also stated that Web 2.0 can be defined as a range of activities and not just technologies. We have, in the paper *"Contributing to a Learning Methodology for Web 2.0 Learning – Identifying Central Tension in Educational Use of Web 2.0 Technologies"* (Glud et al., 2010), presented an argument based on something Dohn also stresses, which argues that just because a teacher integrates Web 2.0 as a technology or resource in their teaching practice, that does not necessarily make it a Web 2.0-based activity. The teacher also has to be thinking about the Web 2.0 ideologies, and to integrate these into the Web 2.0-based activity. Web 2.0 can equally be used when teaching is more curriculum- and content-based. There needs to be an understanding of the way in which the activity adapts to the philosophy of Web 2.0 thinking. When the term "Web 2.0" emerged there was much focus on its development, and on Web 2.0 technology and the kinds of Web 2.0-mediated tools (social software) to use within teaching and learning, but also on looking into different opportunities and tensions from a technological perspective (Crook et al., 2008). There were articles about cases of users of Web 2.0 tools focusing on their practical use in different learning situations (Cubric, 2007; Grosseck & Holotescu, 2008; Heid, Fischer & Kugemann, 2009).

The research in this area has begun to increase[5] and until now much of it has been from the technological perspective. Until 2009 little research had therefore been conducted and documented with a focus on the implementation process, and on practice from a teacher perspective, the learning aspects and potential, focusing on teacher integration of this kind of technology (Gráinne Conole & Alevizou, 2010). What is more, only a little research had been undertaken on the pedagogical approaches these kinds of technologies might support when bringing them into learning practice. My research approach therefore contributes to these perspectives. In this dissertation I will use the term "Web 2.0" generally, whilst being aware of other terms such as "social media" or "social software" that have arisen in the wake of Web 2.0.

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[5] Carrying out a literature search in Scopus.com and Google Scholar on the words "Web 2.0 AND Learning or Teaching" with the years 2007–2010 showed that the number of articles increased in the years 2009 and 2010.

Looking at Web 2.0 practices from a learning perspective, there will be tensions that challenge the educational setting, as we know it, and that we will have to face when integrating Web 2.0-mediated learning into teaching practice. Dohn (2009) stresses that there are at least three tensions or challenges between Web 2.0 practice and educational practice. One is "*collaboration in learning*", the opposite of reusing or being "a free-rider" in a Web 2.0 contextual setting, and something that would be seen as cheating in an educational setting. This can be dealt with by developing a framework for activities that takes this into consideration. Another issue is the way in which to "*evaluate the work done by students*". Dohn presented a number of perspectives through which to consider this. First, taking a Web 2.0 approach would involve participation as a criterion for evaluation, but from a learning perspective there should also be evidence of knowledge, competences within the field and quality of content. Secondly, there is the question of "who" is to undertake the evaluation, which gives different views on the role of the teacher. They have a pedagogical responsibility for the student's learning. The last issue Dohn notes concerns "*the material students produce*" and deals with the reuse and collection of material (also called "patchworking") without carrying out any kind of critical reflection, which would be fine in a Web 2.0-mediated learning context, but considered plagiarism from the educational perspective (Dohn, 2009; Dohn & Johnsen, 2009).

Whilst dealing with tensions in the relationship between Web 2.0 and PBL, "control" or "power" in the relationship between teacher and learner could be considered, depending on the degree to which the teaching is teacher-centred or learner-centred (Ryberg et al., 2010; Ryberg, Koottatep, Pengchai & Dirckinck-Holmfeld, 2006). In the EATrain2 project, we looked further into this issue as well as the others stressed by Dohn, and I will touch on this briefly later in this dissertation, as it is also incorporated in the methodological approach.

As previously argued in Part II of the dissertation in my article *"Scaffolding Teachers to Integrate Social Media Into a Problem-Based Learning Approach?"* (Buus, 2012), social media and Web 2.0 provide research opportunities to study phenomena such as collaboration, active students and user participation, which are also presented in the PBL pedagogical approach at AAU. Savery (2006) stresses that there are similarities between PBL and case-based learning and project-based learning, and that one could argue that they all operate within an active learning approach. Savery (2006) identifies three main characteristics of PBL: 1) the teacher has the role of a facilitator of learning, 2) students (or learners) have the responsibility to be self-directed and self-regulated, and 3) the driving force for inquiry is dealing with real-world problems (Savery, 2006, p. 15). This could be related to the tensions and challenges Dohn (2009) identified, as presented earlier, and it is interesting to consider these tensions and challenges when looking further into this topic of Web 2.0-mediated learning and the PBL pedagogical approach. I would like to contribute to research that focuses on learning and teaching within the

research area of PBL, where students are involved and actively participating in problem-based, collaborative and user-generated activities supported by Web 2.0 technologies.

Based on these interests, my experience with the implementation of Moodle, and the focus I would like to take in my research project, several questions come to mind: for example, *"what kind of impact would the use of Web 2.0-mediated learning have on the intended learning process?"* or *"how will I be able to support teachers who wish to integrate Web 2.0-mediated learning in their pedagogical learning design based on a PBL approach whilst focusing on Web 2.0-based activities?"* or *"how can teachers obtain knowledge about different kinds of activities and technologies within Web 2.0?"*

My approach, therefore, has been to study the integration of Web 2.0-mediated learning activities in PBL from the AAU perspective and to study the process underpinned by a learning design (LD) methodology, whilst also using action research (AR) to interact with teachers in their design of activities integrating Web 2.0-mediated learning into their teaching. I have chosen to approach this from the perspective of 'integration' rather than 'implementation', which I will come back to in my theoretical framework.

Choosing to work with learning design or design for learning as an approach, involves scaffolding teachers in the design of their learning practice (Maina, Craft & Mor, 2015; Ryberg, Buus, Nyvang, Georgsen & Davidsen, 2015). Learning design deals with the different tools, methods and frameworks that are available to practitioners when they are designing *for* learning. Conole (2013) defined learning design as:

> *"A methodology for enabling teachers/designers to make more informed decisions on how they go about designing learning activities and interventions, which are pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum-level design. A key principle is to help make the design process more explicit and shareable. Learning design as an area of research and development includes both gathering empirical evidence to understand the design process, as well as the development of a range of learning design resource, tools and activities."*
>
> *(Gráinne Conole, 2013, p. 8)*

My intention was to look into Web 2.0-based learning activities supported by Web 2.0 technologies, which is very well supplemented by an approach to learning design as Conole defines it.

Choosing the action research approach also relates to the way in which I would like to work with my research. Action research aims to generate concrete changes in a practice context (as, for example, teaching practice) and investigates how these changes can be fostered, but action research is also based on the desire to make these changes *with* others in a collaborative and developmental process (Duus, Husted, Kildedal, Laursen & Tofteng, 2012; Reason & Bradbury, 2008). There is a need to support the change process in this kind of Web 2.0-mediated integration initiative, and Nielsen and Svensson (2006), who also operate within action research, stress that:

> *"The need for support and consultation in this change process was stressed while systematic documentation, critical analysis and the production of general theories were seen as less important."*
>
> *(K. A. Nielsen & Svensson, 2006, p. 29)*

I was therefore led to examine what might happen or what might be done, and how to make these changes occur, at the same time as exploring the opportunities and strategies for action that need to be discovered (Duus et al., 2012).

Duus (2012) further argues that there are two ways in which projects within action research can be generated. Authors can write about what can be defined as "a describing project", where they deal with questions concerning "what is" and "which", or another approach could be to investigate the cause, and ask questions using terms such as "why" or "what if". In many cases researchers are investigating both approaches at the same time.

I would like to further define the questions I introduced above and bring in as the first iteration of my research questions, which will contribute by offering a methodology for the integration of new technology in teaching practice:

- *"What needs to be done to support and scaffold teachers integrating new technology, e.g. Web 2.0 technologies, into their practice within the context of PBL?"* and
- *"Can this somehow form the basis of developing a learning methodology within the use of Web 2.0 in teaching and learning?"*

I will elaborate on my research questions and my contribution to research when I have introduced my theoretical framework and the connection I make between Web 2.0, PBL and networked learning.

1.3. LEADING YOU THROUGH THIS DISSERTATION

I have written this dissertation based on a number of articles, of which I have chosen three, which I see as giving it a common thread. I have substantiated my research in

supplementary but more peripheral articles that I have written over the years. My three main articles were chosen because they each and together give an insight into the learning experience my research has provided, from the starting point of fostering my interest in the area to providing methods to tackle my research questions and formulating responses. These articles are found in Part II.

I found it important to document both my process and my progress over time by describing my research. I consider this research process a great experience and a journey in learning. I have split the dissertation into two parts, of which this is Part I, which is a presentation of the research, the journey in learning that I undertook, and the considerations and choices made during the research process.

In this first chapter I have tried to demonstrate my interest in the research area in which I have chosen to write my dissertation, and also introduce my preliminary research questions, which will be elaborated through the following chapters. The second chapter goes through the theoretical foundation of my research by introducing Web 2.0, networked learning and PBL, and discussions regarding how they can be combined. I discuss my use of the terms integration versus implementation, and I discuss one of the key concepts in this dissertation, scaffolding. Based on my theoretical chapter I also clearly define my research questions.

In the third chapter I present my methodological approach, taking the point of departure in action research as my main methodological approach, but combine it with a collaborative method for designing for learning to begin the collaboration with teachers. I used the Collaborative E-learning Design method (CoED) (Georgsen & Nyvang, 2007), to spark an interest in integrating Web 2.0 technologies or activities in teaching. Action research is my approach to combining collaboration and research with teachers who have chosen to integrate Web 2.0 in their teaching, and I will, in this chapter, describe the actions taken. I present an overview of my data, and describe how it was approached.

From my methodology I will, in the fourth chapter, describe results, observations and considerations within the three cases representing my empirical foundation. In the fifth chapter I present the articles I have chosen to be part of this dissertation, which can be found in their original versions in Part II (a separate publication). I will explain how the different articles answer my research questions, but I have found that my data contain perspectives that can refine my research questions even further. I have not presented this in any articles so far, and therefore I will need to go more deeply into my data for further presentation.

In the sixth chapter I analyse my data more deeply to help respond to my research questions in combination with the research articles. In the seventh chapter in Part I of my dissertation I discuss, conclude and reflect on my research and my journey in

learning. The appendices included documents referred to throughout the dissertation.

As briefly mentioned, Part II, which is a separate publication, will present the three research articles I have chosen as representative of the dissertation. The articles will be in the following order:

Article I: Lillian Buus (2014): *"From website to Moodle in a Blended Learning Context"*[6], is accepted for publication in The International Journal of Web-Based Learning and Teaching Technologies (IJWLTT).

Article II: Lillian Buus (2012): *"Scaffolding Teachers Integrate Social Media Into a Problem-Based Learning Approach?"* in the *Electronic Journal of E-Learning* (EJEL) (Vol. 10, Issue 1, pp. 13–22).

Article III: Nina Bonderup Dohn and Lillian Buus (2013): *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"* in *Problem-Based Learning for the 21st Century* (1. Edition, pp. 235–259). Aalborg University Press

I believe the three articles demonstrate the way in which I elaborate the dissertation so that it will provide me with the answers to my research questions. Along the way I have collaborated with fellow researchers and produced other articles showing different perspectives and with peripheral relationships to my research in different ways, and during the Part I in the dissertation I will refer to these other articles as underpinning the results of my research carried out in relation to the dissertation.

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[6] After review I have added minor corrections before publishing, and therefore the article presented in Part II of my dissertation will be a former version than the one published.

CHAPTER 2.

2.1. THE THEORETICAL FOUNDATION

This chapter will give an introduction to the theoretical foundation of my dissertation. I will start by giving a view of what actually defines Web 2.0 and clarify my understanding of Web 2.0. I will claim that Web 2.0 has potential for the learning paradigm, and I will thus introduce the research fields of networked learning and PBL within which my research was conducted. Based on this I will sketch a landscape combining these three perspectives, which will bring me to introduce my perspective on scaffolding and integration, together with perspectives on design for learning as the foundation for dealing with the design of learning activities. This has a connection to my methodological approach.

2.2. WHAT ACTUALLY DEFINES WEB 2.0?

In my first chapter I briefly introduced Web 2.0 with a focus on the tensions between Web 2.0 ideals and educational settings, which impacted the various considerations and led to my initial research questions. I will now further examine the general perspectives of Web 2.0 in order to outline the way I see Web 2.0 and how it can be integrated into a PBL and networked learning approach.

When Web 2.0 was initially defined in 2004 by Tim O'Reilly it was based on a concept of different kinds of websites, technologies and a new means of design for social participation, information sharing and web-based communities, and Web 2.0 aimed to enrich interactivity via ICT and online communication processes (Bartolomé, 2008; Santiago Campión, Navaridas Nalda & Rivilla, 2012).

Anderson (2007, p. 5) defines Web 2.0 technologies as:

> *"a group of technologies, […] associated with the terms blogs, wikis, podcasts, RSS feeds etc., which facilitate a more socially connected web where everyone is able to add to and edit the information space".*
>
> *(Anderson, 2007)*

With this emerged the technological possibility of being able to access and share material and resources online, enrich ways of being socially engaged, and to collaborate much more easily. Given the changes in the way people interact, it is also possible to claim that Web 2.0 challenges the pedagogical paradigms with new possibilities for learning. Web 2.0 can be a technological supplement to pedagogical approaches for 'learning by doing', collaborative learning methods and active learning (Anderson, 2007; Freire, 2008).

Sharing and collaboration become essential in the philosophy of Web 2.0, because technology makes it easier and the emphasis in Web 2.0 is on social elements. This can also be seen in the design patterns[7] for Web 2.0 that Rollett, Lux, Strohmaier, Dosinger and Tochtermann (2007) talk about: *cooperate – don't control*, *harnessing collective intelligence* and *wisdom of crowds*. Anderson (2007) speaks about six "core ideas" or characteristics in Web 2.0: *individual production and user-generated content*, *harness the power of the crowd*, *data on an epic scale*, *architecture of participation*, *network effects* and *openness*. In addition, Dalsgaard and Korsgaard (2008) identify and speak about four core activities within the use of Web 2.0: *dialogue*, *networking/awareness-making*, *creating* and *sharing.* Aligning these views and characteristics on Web 2.0 with the terms defining Web 2.0, as mentioned above, it is terms like "participation", "dialogue", "user-generated content", "social networking", "collaborative editing", "blogging" and "social bookmarking" that are defining Web 2.0 from an 'active learning perspective (Anderson, 2007; Dalsgaard, 2005; Dalsgaard & Korsgaard Sorensen, 2008; O'Reilly, 2005).

Social software, or social media, is another typological phenomenon for Web 2.0 technologies or applications. When reviewing the literature about Web 2.0 it has been difficult to clearly delineate the use of "Web 2.0", "social software" or "social media" as terminology, but there seems to be a kind of mixture. Rollett et al. (2007) give a view of what defines social software (social media) compared to the general terminology of Web 2.0, which embraces a broader perspective. Social software is the part of Web 2.0 that deals with the collaborative aspect of Web technologies, such as wikis, blogs, feeds, social bookmarking tools and Web OS (collaborative writing and instant messaging tools), and in particular it is the technology that fosters communication, collaboration, publishing and sharing (Rollett et al., 2007, pp. 7–8). Bartolomé (2008) also refers to these applications, and in addition notes, for example, social networks and group work spaces. Anderson (2007) associates the applications and technologies that can underpin educational activities in a teaching context with the term "Web 2.0", and this is also my perspective. Like Anderson (2007) I will use the term "Web 2.0" in my dissertation, but from a perspective where it incorporates the phenomenon of social software or social media rather than the concrete technologies for Web 2.0, such as AJAX, XML, etc.

It is generally perceived that Web 2.0 opens a broad range of possibilities in education and there are many perspectives on integrating Web 2.0. In a virtual learning environment (VLE) such as Moodle there are multiple possible learning scenarios that could take place, but there is a possible lack of supporting collaborative interactions, projects and group work. This has been one of the arguments for integrating Web 2.0 into teaching as a supplement to the course

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[7] Rollett et al. (2007) talks about eight design patterns in total: the long tail, data as the next item inside, that users add value, network effects by default, some rights reserved, perceptual beta, cooperate do not control and software above the level of a single device.

management-based VLE. Platforms such as Moodle try to integrate Web 2.0 features such as wikis and blogs, and to provide the possibility of adding external plug-ins as well, but there is an issue of whether teachers are ready for this, and what needs to be done to make them aware of the possibilities.

Downes (2005) gives an indication of ways in which Web 2.0 can be used for learning, such as for organising communities of practice within the different programmes, integrating creative activities and placing greater emphasis on use rather than design. Santiago Campión et al. (2012) stress that Web 2.0 has an important role to play, but that there are some obstacles that need to be overcome, such as the cultural aspects of integrating Web 2.0 into teaching, together with the fact that many teachers do not have the knowledge or the training to incorporate Web 2.0 into their teaching practice on their own.

2.3. DOING RESEARCH WITHIN THE FIELD OF NETWORKED LEARNING

In my dissertation I draw on the research area of networked learning (Dirckinck-Holmfeld, Jones, & Lindström, 2009; Dirckinck-Holmfeld, Hodgson, & McConnell, 2012; Hodgson, de Laat, McConnell, & Ryberg, 2014) and problem-based and project-oriented learning (PBL) (Dirckinck-Holmfeld, 2002; Anette Kolmos et al., 2004). Networked learning deals with some of the same core principles that I have found in Web 2.0 and PBL.

In the late 1970s the first experiments within what was later defined as networked learning emerged with the simple use of the internet and online conferencing systems. In the mid-1990s came the development and use of the world wide web (WWW), which held new potential for using ICT in education (Dirckinck-Holmfeld & Jones, 2009). VLEs such as Blackboard and Moodle started to emerge and became pervasive technological platforms for online learning or blended learning, and now often provide the main platform in a blended learning context (Buus, 2015; Schroeder, Minocha, & Schneider, 2010). In the early twentieth century new changes in technology emerged, which also affected the direction of networked learning. These changes were connected to the shift from what has been defined as "Web 1.0" into what from its first stage defined as "Web 2.0" (O'Reilly, 2005).

With the shift towards using Web 2.0, technological issues already dealt with came into focus again in a networked learning context, such as the interaction between people mediated by technology, issues known from computer-mediated communication (CMC), which focuses on communication between people mediated by ICT, and the internet, but also from the perspective of computer-supported collaborative learning (CSCL), which focuses on collaborative processes mediated by ICT in a learning context, and computer-supported collaborative work (CSCW), which focuses on ICT-based collaboration at work and in the workplace (Dirckinck-

Holmfeld & Jones, 2009; Goodyear, Banks, Hodgson, & McConnell, 2004; Hodgson, McConnell, & Dirckinck-Holmfeld, 2012).

From a learning theory perspective, networked learning can be defined as a cross-disciplinary research approach, and networked learning theory lies within the pedagogical paradigms of social constructivism, situated learning and social learning theory (Jones, 2004, 2008; Jones & Dirckinck-Holmfeld, 2009; Jones & Esnault, 2004).

Using Web 2.0 tools in teaching and learning provides new opportunities for collaborating, sharing knowledge, creating something together and actively participating, and in general the ability to make different kinds of connections between various kinds of users. This is very much in line with the definition of networked learning:

> *"Networked learning is learning in which information and communications (ICT) is used to promote connections: between one learner and other learners, between learners and tutors, between a learning community and its learning resources."*

> *(Goodyear et al., 2004)*

In this definition of networked learning it is important to notice that it is dealing with the connections *between* people, and *between* people and resources, but it also points to a certain level of social organisation between students (learners), teachers and different kinds of resources, for example in relation to a learning community. It is building on the interactions between people, mediated by ICT (or Web 2.0 tools).

From the perspective of networked learning, as also stressed by Jones, Ferreday and Hodgson (2008), the construction of learning and knowledge takes place in the connections and interactions between students (learners), teachers and resources, and emerges from critical dialogues, inquiring and investigation. Based on this perspective, learning is not limited to the individual mind or the individual learner, but can be seen as social interactions and practices, which furthermore aligns well with sociocultural or social learning theories, which also situate and analyse learning in social practice and interaction (Jones & Dirckinck-Holmfeld, 2009).

Networked learning theory does not exempt a particular pedagogical model or ideal, but it has sometimes been broadly used in relation to e-learning, online learning and technology enhanced learning (TEL). Leading researchers within the field of networked learning argue that problem- and project-based learning can be seen as an example of productive networked learning (Dirckinck-Holmfeld & Jones, 2009, p. 281).

Networked learning generally speaks of learning mediated by ICT, and the relationship between the design of a technology and the use of that technology is central in research within networked learning. Within networked learning the emphasis is on the collaborative aspects of learning and the cooperative possibilities available in online learning (Jones & Dirckinck-Holmfeld, 2009).

Networked learning can also be seen as a socio-technical way of organising learning to enable learners to interact, connect, engage, relate to and collaborate in joint activities, and, in a dynamic way, to accumulate and regenerate concepts, artefacts and knowledge in a variety of forms and from a variety of sources, and by looking at Web 2.0 (Jones & Dirckinck-Holmfeld, 2009; McConnell, Hodgson & Dirckinck-Holmfeld, 2012). Jones and Dirckinck-Holmfeld (2009, p. 264) argue that PBL and the future development of the networked learning approach are highly suited to a Web 2.0-mediated learning environment. Web 2.0 technologies may be used in different ways that underpin the pedagogical principles of networked learning, and as such provide a learning infrastructure change within networked learning that provides different learning designs than from a practical perspective (McConnell et al., 2012).

2.4. WORKING WITHIN PROBLEM-BASED LEARNING (PBL)

During the course of the research project, it was clear that everyone looks at course work and project work at AAU differently, and the illustration of PBL in Chapter 1 may have developed over time in many different directions. Most literature written about PBL at AAU concerns the process of student project work, and relates little to the course work that also has to build on the PBL approach that underpins the AAU pedagogical model. The research in my PhD deals with the PBL taking place on courses, and I reflect on how the complex landscape of PBL practices can actually be identified.

When considering PBL from the early stages in the 1970s at McMaster University in Canada, where Howard Barrows initially defined it as a concept, we see that the role of students and teachers is changing from the more traditional teacher-centred approach to a learner- or student-centred approach. Students become responsible for their own learning and teachers are supposed to stimulate, scaffold and facilitate the learning process of the students by setting the framework for "real-world" problems that students need to solve within small groups (Barrows, 1986, 1996; Barrows & Kelson, 1993; Anette Kolmos & Graaff, 2003).

There are many definitions of PBL and the introduction to *The Interdisciplinary Journal of Problem-Based Learning* (IJPBL)[8] Ertmer (P. Ertmer & Macklin, 2006) deals with an assumption that:

> *"At its core, a problem-based approach is designed to help students achieve two goals: (1) to acquire a deep understanding of specific content knowledge, and (2) to develop problem-solving and higher-order thinking skills".*
>
> *(P. Ertmer & Macklin, 2006, p. 1)*

Howard Barrows (1986) and Barrows and Kelson (1993) identify PBL practices or the design of PBL practices within teaching as relating to lecture-based cases, case-based lectures, the case method, and what is defined as "reiterative problems" or closed-loop problem solving. They argue that teachers should decide on their desired educational objectives and, based on this, select a fitting PBL method to accomplish them (Barrows, 1986). Barrows argues that problem-based learning does not refer to a specific educational method, but depends on other issues such as learning designs or methods, and teacher skills.

In the article "*Identifying Differences in Understandings of PBL, Theory and Interactional Interdependencies*" (Ryberg et al., 2010) we also refer to Barrows and his taxonomy on variables within PBL, which intend to facilitate an awareness of differences between "*the problem*", "*the process*" and "*the sequence*" and help teachers choose the problem-based learning approach most appropriate for their educational objectives. Ryberg et al. (2006) elaborated on the three variables from Barrows and rephrased the questions or considerations to be taken when designing for learning in a PBL approach, which therefore deals with "*the problem*", "*the work process*" and "*the solution*" in between the continua of "*teacher control*" or "*participant control*". I will return to this, as this is part of the methodological approach used to deal with PBL in Web 2.0-mediated learning.

In line with Barrows and Kelson (1993) and also Dirckinck-Holmfeld (2002), Kolmos and Graaff (2003), Savery (2006) and Savin-Baden (2007) stress that the important factors in PBL are activities that underpin collaborative learning, problem solving, student-centred learning (decision-making), negotiation of meaning, critical thinking skills, self-directed learning, knowledge sharing and active participation. In the networked learning and PBL approach, learning is achieved via participation in communities of learners where knowledge, meanings and understanding are created through negotiation, interaction and collaborative dialogue based on personal real-life experiences (Hodgson et al., 2012).

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[8] IJPBL was first published in 2006.

Kolmos and Graaff (2003) listed the typical learning principles characterising PBL. The first is *problem-based learning*, where a problem is the starting point of the learning process. Next are *participant-directed learning processes*, which are related to responsibility and control regarding the formulation of the problem, which in the most part should be the student's responsibility. Within the participant-directed learning process is also the notion of *experience learning*, which suggests the importance of integrating a participant's own experience as a motivating factor in dealing with a problem, thereby making the problem "real-world" identical, which should also be considered. Planning for PBL also needs to involve *activity-based learning*, as the learning process requires activities that involve factors such as research, decision-making, negotiation, reflection and writing. It is also important for teachers to be aware of opportunities for *interdisciplinary learning* to take place. Students need to develop the skills to transfer the knowledge, theory, and methods already learnt and bring these into new areas of their learning to gain what can be defined as *exemplary learning*. Last but not least, the work is to take place in groups, to underpin *group-based learning* and give students the competences to be involved in, and learn from the processes taking place when they are working in groups.

PBL in the Danish context involves, in a variety of ways, the learning principles outlined above, and also builds on experimental learning inspired by Dewey and Negt in the early 1970s (Byghom & Buus, 2009; Anette Kolmos & Graaff, 2003), when, for example, Roskilde and Aalborg Universities were being established. The PBL approach at AAU also has its theoretical roots in critical pedagogy, social constructivist (Savery & Duffy, 1995) and sociocultural approaches to ICT and learning, and also in inspiration from Lave and Wenger (1991) and Wenger (1998) and their work on situated learning and communities of practice (CoPs).

Looking at this from what Barrows has said about the three areas of awareness within PBL and how different kinds of learning theory are defined within the continua between teacher or participant control, and inspired by Ryberg et al. (2006) and Ryberg et al. (2010) I have illustrated this process:
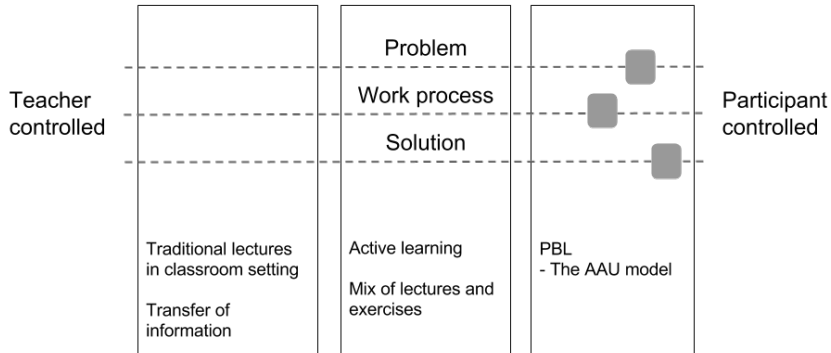
Figure 2: Learning approaches in relation to teacher and participant control.

As mentioned earlier in my thesis, the PBL model at AAU is based on the students and their work within courses and project-oriented group work, with approximately 50% of the time spent on course work and the other 50% on project work. At many institutes there has been an elaboration of the PBL model, which suggests that the courses are more independent and can in principle be divided into five ECTS points per course (Kolmos & Holgaard, 2012). This can be illustrated in this way:
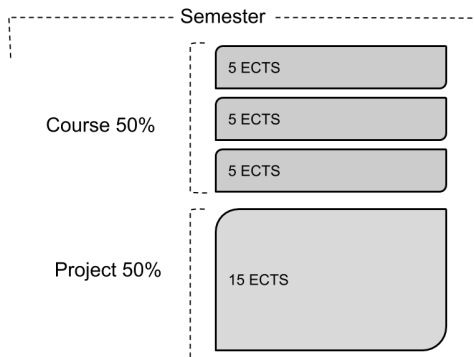
Figure 3: Illustration of course and project work within the AAU PBL model.

The process students go through when they identify, define and describe a problem substantiates different skills within the higher order of thinking (analysing, reflecting, evaluating, etc.), and it should give the student or group of students ownership and thereby engagement in their own learning process (Barrows & Kelson, 1993; Ertmer & Simons, 2005; Jones & Dirckinck-Holmfeld, 2009; Kolmos

et al., 2004). It is also possible to some extent to include this process in the courses, but this may be a more teacher-centred process. Interaction and collaboration as part of the work itself and in order to solve the problem is also important in the learning process of the students. This is strongly supported by PBL and the focus on interaction, participation and collaboration is important in relation to the integration of Web 2.0-mediated technologies in order to underpin the learning process and the activities involved. I therefore find it interesting to investigate this correlation between PBL and Web 2.0-mediated learning, and I will do this through the philosophy within the paradigm of networked learning that says:

"We cannot design learning we can only design **for** *learning"*

(Dirckinck-Holmfeld & Jones, 2009, p. 277)

2.5. WEB 2.0, NETWORKED LEARNING AND PBL – HOW DO THEY COMBINE?

Elaborating on how to design for learning, with the generation of Web 2.0 technologies there is great potential to look further into how these technologies and Web 2.0-based activities promote learning potential within the networked learning tradition and within a PBL paradigm. In this sense, the intended learning outcomes of PBL and networked learning, combined with the idea of students as more active, productive and engaged in real practices, seem to correspond well with the ideas and ideals associated with Web 2.0. Web 2.0 opens numerous possibilities for investigating and rethinking the architecture for participation, involving users who feed into the development of Web 2.0 applications (O'Reilly, 2005, pp. 8, 17). Additional potential was identified by Crook and Harrison (2008), as Web 2.0 seems to offer students diverse skills and competences through gaining more control over their own learning, and offering more collaborative ways of working, including community creation, dialogue and knowledge sharing. It also establishes engagement in enquiry, collaboration and publication, which support still more diverse skills and competences that seem to relate to PBL (Crook & Harrison, 2008, p. 11).

Using a VLE such as Moodle is one way to support interaction and dialogue, but as Hack (2013) also argues in her latest research, a VLE is often used as a repository or broadcast medium focusing on the delivery of content in a flexible way, and statistically, 80% or 90% of teachers use the VLE for delivering information, while Web 2.0 technologies within the VLE[9] are barely used. This is also what I have seen and experienced in my daily work in IT Services (ITS). Although there are some

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[9] Here Hack (2013) talks about discussion boards (forums), wikis and blogs, which are also integrated in, for example, Moodle and she refers to another previous study supporting her findings.

teachers who use the VLE for collaborative purposes, the majority use the VLE to provide access to material of different kinds, while interaction and activities take place in face-to-face lectures (Buus, 2015). This occurs despite the fact that VLEs such as Moodle incorporate interactive Web-based technologies and tools together with the possibility of engaging with these kinds of Web 2.0 technologies outside the VLE as well.

Relating Web 2.0's ideology and terms of reference to the terms of reference also seen in PBL such as *student-centred (user-generated) content*, *active participation (creating)*, *interaction*, *(social) networking*, *knowledge sharing*, and *collaborating and cooperating in a social context,* and furthermore in the networked learning pedagogical approach, it will be possible to combine the approach to Web 2.0-mediated learning that is integrated in teaching and learning supporting the PBL, and networked learning pedagogy. The ideas and the interest around Web 2.0 technologies and activities within learning (learning 2.0) and e-learning (e-learning 2.0) seem to have had, and still have, a broad educational impact, and seem to be able to change or at least underpin the educational practices in what I will term a shift from more teacher-centred to learner-centred (student-centred) approaches, and from a more collaborative perspective (Crook & Harrison, 2008; Downes, 2005; Redecker, 2009). On the other hand, it is still important to support and scaffold learners in this "new way of learning", as well as supporting teacher integration of this in their practice.

From the perspective of Kreijns, Kirschner and Jochems (2003), social interaction appears to be the key to collaboration. They claim that if there was collaboration then social interaction would be a part of this, and vice versa. If there was no social interaction then they stress that there is no real collaboration (Kreijns et al., 2003, p. 338). With regard to defining collaboration vs. cooperation, I incline to the definition introduced by Roschelle and Teasley (1995, p. 70) and supported by McConnell (2002), which distinguishes between collaboration and cooperation in the division of labour among participants and the way in which they handle the work. Kirschner (2001) stresses that there are similarities between the two: for example, the fact that learning is active, the role of the teacher is more as a facilitator rather than a "sage on the stage", teaching and learning are built on shared experiences, activity takes place in small groups, students are stimulated to reflect on their own learning processes, and social and group-based skills are developed through interaction and negotiation of meaning.

Social skills and interactivity generally important in Web 2.0-mediated learning, PBL and networked learning, and the involvement of users and their participation is also important in Wenger's (1998) perspective on learning in communities of practice (CoPs). Concepts such as the negotiation of meaning, collaboration, user participation and problem-based learning are the focus when talking about user involvement and the creation of communities, situated learning and collaborative

learning processes, together with social participation (Lave & Wenger, 1991; Wenger, 1998).

Bringing together all these perspectives of networked learning, PBL, CoPs and active learning, means that the mainstream interpretations of Web 2.0 highlight more social interactive, student-centred, collaborative and production-oriented pedagogical strategies, and align very well with most of the perceptions of PBL and networked learning. As also stressed in the article *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"*, Dohn and I further found that the term "active learning" (Bonwell & Eison, 1991; Anette Kolmos & Holgaard, 2012) could also be defined within the frame of PBL, and this could help with the problem I have had in defining the pedagogical landscape of PBL and "the Aalborg Model" Based on this I could elaborate on the illustration of PBL at AAU and then talk about active learning taking place in the courses, and PBL taking place in the project work. It could be illustrated like this:
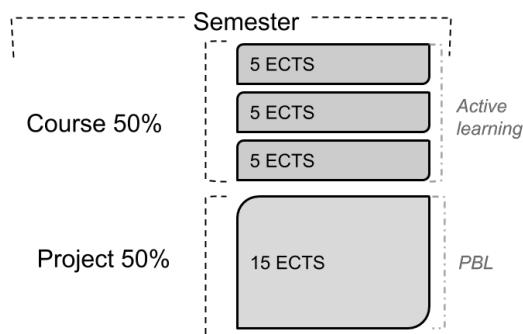
Figure 4: The AAU PBL and active learning model.

While the theoretical differences within all these pedagogical approaches might be difficult for practitioners to make immediate sense of, they make quite a difference when it comes to the practical design of Web 2.0-mediated and networked PBL courses, but also in deciding which Web 2.0 technologies and practices to incorporate in a particular course in order to support this Web 2.0-mediated learning approach in a PBL context.

2.6. TOWARDS DESIGN FOR LEARNING

To enable teachers to deal with the practical design of Web 2.0-mediated and networked PBL courses, it is important to scaffold them in thinking and designing for learning activities. Teachers need to redefine their mind-set around their role and think of themselves as 'designers for learning', as learning can not be designed, but

learning can be designed *for* (Dirckinck-Holmfeld & Jones, 2009; Goodyear & Dimitriadis, 2013). What may be an issue in this is the fact that teachers are often left behind and dis-empowered in their potential to design and integrate new elements of their learning (Maina et al., 2015). In a mapping of the barriers to integrate ICT in teaching practice it is clear that teachers need to be supported in building the bridge between technology and the pedagogical issues they face ((Khalid & Buus, submitted). Thinking about scaffolding is therefore important in integrating Web 2.0 mediated learning activities.

As mentioned in my introduction I have chosen the perspective of 'integration' rather than 'implementation'. Using integration as a term in a PBL approach is based on the definitions of the two terms. Integration is defined (if used with an object) as a way of bringing together, combining or incorporating elements into a whole (Dictionary, 2015b). From a holistic perspective, integration is relevant to my research context, as it is mainly based on the process and accommodation of the learning goals supported by ICT and by looking at how to set up ICT-based activities and overcome the barriers that might occur in the integration process (Hew & Brush, 2007; Khalid & Buus, submitted; Tondeur, van Keer, van Braak, & Valcke, 2008). As related to teaching and learning, I see integration as a way to develop or maybe even fundamentally change one's teaching, for example by making Web 2.0-mediated learning part of teaching practice.

The term 'implementing' refers to carrying out an agreement made as part of the project plan for implementing Moodle at FSS (Dictionary, 2015a). Some use the terms uncritically, but when reviewing the literature on implementation it often refers to a more systemic approach to the use of ICT in education, installing different kinds of learning platforms or systems to support ICT (Buus, 2015; Hartmann, Fischer, & Haymaker, 2009; Jimoyiannis, Tsiotakis, Roussinos, & Siorenta, 2013). In my research I use the terms according to a conviction that integration focuses on the process of learning supported by ICT, whereas implementation focuses on technological issues used to support learning.

Both integration and implementation have individual goals. Implementation has the main goal of successfully implementing a learning management system for supporting learning processes or/and to integrate technological tools that have an changing impact, such as 'to make a change from what is to something different or new' (Nyvang, 2003). It could be stressed that integration comes after or to some extent is run in parallel with implementation. The goal of integration is to develop or change the learning processes by framing different activities supported by ICT.

The implementation section of my PhD research was an initial process, which gave me insight into the issues involved in scaffolding teachers in their process of using ICT in initiating activities in teaching. Different reflection during the implementation process and my collaboration with the management, teachers and

administrative staff was the foundation for my further PhD research work. I focused more on combining pedagogy and learning activities, supported by ICT for teachers to integrate Web 2.0-mediated learning activities into their teaching, to scaffold the changes in the learning practices and processes.

2.6.1. DEFINING SCAFFOLDING IN THE PROCESS OF DESIGN FOR LEARNING

Research in general (Bingimlas, 2009; Khalid & Buus, submitted), and also my own research, has shown that facilitation during the integration process, when integrating ICT or Web 2.0 into teaching, is an important issue. Teachers often lack pedagogical and technological knowledge about the acquisition of technology and combining the two. The notion of integration can be seen as a learning process for teachers, supporting this lack of knowledge, and I find that the concept of scaffolding is a way to support this learning process. Using a process of learning design can supplement and support the concept of scaffolding.

Scaffolding as a concept can be conceived from the perspective that it involves presenting learners, who in my research are the teachers, with proper guidance that can move them in the direction of what they will or intend to learn. Scaffolding was originally, often associated with the relationship between child and adult (teacher, family, and others) or between teacher and learner. The foundation of the term 'scaffolding' is based on research by Vygotsky (1978) and his concept of 'experts' guiding or supporting a 'novice' or an 'apprentice' (individual learner) to learn within their *zone of proximal development* (ZPD). The ZPD refers to the gap between what an individual learner can or cannot do without help from an expert, peer or teacher, and the time until the individual learner is able to do this on their own (Daniels, 2007; Vygotsky, 1978; Wood & Wood, 1996). Within the terminology ZPD the term 'development' is based on gaining new knowledge and skills to get beyond the ZPD (Vygotsky, 1978). Vygotsky explains it thus:

> *"It is the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers."*
>
> *(Vygotsky, 1978, p. 86)*

Chaiklin (2003) uses the term 'scaffolding' from the perspective of Vygotsky to define practices designed to teach specific skills or subject matters that are not designed for instruction, but rather build on developmental purposes (Chaiklin, 2003; Daniels, 2007). This kind of developmental purpose is essential in my research, as the interaction that I as researcher and 'the expert' have with the teachers (the individual learners) builds on developing their knowledge about

combining learning activities with ICT to create Web 2.0 based learning activities in their teaching set-up. Daniels (2007) defines scaffolding:

> *"In scaffolding the overall emphasis is on the creation of a pedagogical context in which combined teacher and learner effort results in a successful outcome."*

> *(Daniels, 2007, p. 317)*

Daniels (2007) also explains that other researchers have suggested that the focus of change within ZPD should be on the creation, enhancement, and negotiation (communication) of meaning through the collaborative use of mediated or social actions rather than on the transformation of skills from a more to a less capable partner. Other researchers have operated with related concepts of scaffolding, such as Collins et al.'s (1987) term 'cognitive apprenticeship', or Rogoff (1990) who worked with 'guided participation', both where focus was also on different kinds of interaction and the joint responsibility for the learning progress.

In my research the roles in respect of scaffolding and ZPD thinking may involve a dilemma, as the teacher or practitioner can be seen as a novice in the field of integrating Web 2.0-mediated learning activities in their teaching, and which they need to learn and gain knowledge about. On the other hand the teachers are experts in their area of teaching. This gives an interesting dimension to the relationship between the teachers and myself as researcher. As the researcher with expertise in using the technologies from a pedagogical perspective in teaching and learning, I need to gain preliminary knowledge about the field within which the teachers operates, and I therefore need to learn from the teachers. The collaboration and interaction taking place between myself and the teachers within each of our fields of knowledge makes me the person who is scaffolding the teachers in their 'learning process' in order for them to be able to integrate Web 2.0 mediated learning activities. The teachers, on the other hand, will be the experts in their area of teaching compared to the students. This gives the teacher a learning perspective from which to move students towards their learning goals via the activities initiated. Along these lines, I concentrate my research interest around learning methodologies, pedagogy and the use of ICT, both Web 2.0 based, or ICT in general.

One of the essential features in scaffolding involves the interaction between 'the learner' and 'the expert'. It is important that this interaction is collaborative for it to be most effective (Wood & Wood, 1996). Using the action research approach together with a learning design gives the potential to scaffold teachers based on their idea of what they see as their 'learning goals', meaning the kind of activity they want to initiate and how the activity can be supported by ICT. I will return to this relationship between the teacher and myself as researcher in Chapter 3, where I look more closely at the action research approach I have taken.

Another feature of scaffolding is that learning takes place in the ZPD from the learner's perspective, and it is therefore important to be aware of the learner's current level of knowledge within the learning goals, and to work from there to extend the knowledge and move the learner forward. The support and guidance that is provided to scaffold the teacher needs to be gradually removed as the learner becomes more and more confident and proficient. The scaffolding can be compared metaphorically to that used to scaffold construction buildings, which provides adjustable and temporal support, that is removed when the building is able to stand on its own. It is important as 'the expert' to be aware that the support and guidance provided to learners needs to facilitate internalisation of the knowledge needed to accommodate the learning goals or the task outlined (Wood & Wood, 1996).

Daniels (2007) promoted a discussion about whether the ZPD is created through negotiation (of meaning; (Wenger, 1998)) between the teacher and the learner rather than provided through a scaffold in some kind of one-way instruction. He pointed out that the key question here is where the hints, support or scaffolding comes from. Are they produced by 'the expert' or are they negotiated? (Daniels, 2007, p. 318).

Vygotsky's definition of ZPD leaves us with a need to identify the guidance and collaboration that promote development, and to specify what is learned during the interaction between teacher and learner (Wood & Wood, 1996, p. 5). Scaffolding can be seen as one way to identify this, and scaffolding as presented above combines with the perceptions behind my idea of integration and designing for learning. I will introduce this, combined with the methodological approach in Chapter 3.

2.6.2. DESIGNING FOR LEARNING: DEALING WITH LEARNING DESIGN

In the introduction to "*The Art & Science of Learning Design*" (Maina et al., 2015) the editors consider both 'learning ' and 'design' in order to gain an understanding of the term 'learning design'. They conclude that the common element within learning is a change in the human condition, in different ways, and education is about directing learning, whereas the approach the teachers often lack knowledge about will be within the domain of design. 'Learning design' as a term thus builds on some of the same elements found in scaffolding; such as interaction, joint progress, structure, collaboration, and knowledge sharing.

Britain (2004) proposes three ideas behind learning design, which also represent new possibilities for increasing quality in teaching and learning. One is that people learn better when they are actively involved in something. The second idea is that using learning design provides an opportunity for learning activities to be structured in a learning workflow, and thereby encourage more effective learning. The third idea concerns the ability to reuse and/or share learning designs among teachers. Britain (2004) also stresses that there are two main advantages from a teacher

perspective, that are associated with deliberately planning and thinking about the process of designing learning activities. Learning design is centred on learning activities, and in particular it is important to keep the activities in focus when designing for learning, as also stressed by Dohn (2010). Learning design provides a framework for deeply and creatively reflecting on the design and structure of the activities to be taught and learned. This is so that effective learning design can be shared among teachers (Britain, 2004).

Another researcher dealing with learning design is Koper (2006), who defines learning design as:

> *"a description of the teaching-learning process that takes place in a unit of learning."*
>
> *(Koper, 2006, p. 13)*

In Koper's terminology the "unit of learning" can be a course, a single lecture or a series of learning activities. Koper (2006) furthermore stresses that the key elements when talking about learning design are the learning activities taking place and that have been designed, but he also stresses the importance of activities that have a supportive role in the main activities. Within the context of a "unit of learning" all these activities are accomplished by the teacher and the learner (the 'student').

As mentioned earlier, Conole (2013) also deals with learning design, and she defines learning design as:

> *"A methodology for enabling teachers/designers to make more informed decisions on how they go about designing learning activities and interventions, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to curriculum-level design. A key principle is to help make the design process more explicit and shareable. Learning design as an area of research and development includes both gathering empirical evidence to understand the design process, as well as the development of a range of learning design resources, tools and activities."*
>
> *(Gráinne Conole, 2013, p. 8)*

Conole is more detailed in her definition, but still refers to the activities as important, and notes that the focus in learning design is on the process. Like Britain, Conole also speaks about the possibility of making learning design shareable and explicit. Conole stresses the pedagogical perspective for consideration when dealing with learning design, but also the documentation of how the process evolves so as to be able to modify and adjust the learning design. Many teachers intend to develop

their teaching practice in a way that can more or less be immediately integrated into their teaching and practice context (Salmon & Wright, 2014).

Mor and Craft (2012) stress that learning design is a creative process based on the design of new practices, activities, resources and tools, which will underpin particular learning objectives in a given educational context. The authors add that it should be qualified by knowledge within the subject, knowledge based on pedagogical theory, a minimum of technological know-how, and experience within practice. It should also generate innovation in these different areas and learners should benefit from it regarding the time they invest, and their efforts and aims (Maina et al., 2015; Mor & Craft, 2012).

Based on the many different terms defining learning design (Maina et al., 2015) and the way in which learning design seems to be rooted in relation to a product (Koper, 2006) or to a process (Conole, 2013) there appears to be a lack of clarity in the field, which needs to be discussed further across the different definitions (Goodyear & Dimitriadis, 2013; Maina et al., 2015). Dobuzy (2011) suggests learning design be classified into three different types: 1) as a concept, 2) as a process, and 3) as a product; but seen from a design perspective the workflow of learning design follows sequentially in the way that it needs to be conceptualised before becoming a process that can lead to a specific product (Dobozy, 2011; Maina et al., 2015). The general concept of learning design builds on activities, collaboration and workflow, combined with awareness within the areas that Mor and Craft (2012) specify. Teachers who are designing for learning need to consider and design for the learner's ability to find other kinds of information in addition to that provided by the teacher. Teachers also need to think about opportunities for activities such as investigation, exploration and analysis, based on the knowledge synthesised, and go beyond that by collaboratively constructing new knowledge from the variety of technological resources available to them (Maina et al., 2015, p. ix).

Researchers such as Goodyear and Dimitriadis (2013) and Beetham and Sharpe (2007) stress that they prefer the term 'design for learning' rather than 'learning design'. Their argument for this originates in the terminological way of thinking, because 'learning design' from their point of view is perceived as more in line with a product and not a process. They have the conviction, which I also stress, that 'you can design *for* learning, but not design learning', and they also believe that 'it is only the person that is learning, who can learn', and that the teacher cannot determine what is learned: teachers are not able to design a person's learning, and this is their argument for using other terminology (Goodyear & Dimitriadis, 2013). I see learning design as a creative, critical and reflective process within the 'scaffolding' conceptual framework where teachers are to integrate and design for learning activities. It furthermore combines very well with the networked learning and PBL perspectives on a learning approach.

I agree with the beliefs Goodyear and Dimitriadis also stress:

> *"There is a gap between a) that which has been designed; and b) the activities in which people engage (through which they learn) means that one can then try to analyse the relations between (a) and (b). [And] … it is very rare for (a) to determine (b). "*
>
> *(Goodyear & Dimitriadis, 2013, p. 2)*

I presume that teachers involved in learning design can design learning activities that support people's learning, but whether the learner actually learns what the teacher in charge of the learning activity intended cannot be determined beforehand. What can be determined is that the learner gains some information that can be converted into knowledge in the right context. The teacher needs to design for learning by setting up activities that have been considered from something other than the pedagogical perspective. Bringing my role as "scaffolder" into this, I cannot determine what the teacher learns from our joint scaffolding and action research process, but from the activities that follow I can gain an impression of what they have taken in, seem to have learnt or gained knowledge about.

2.6.3. FURTHER DEFINE MY RESEARCH QUESTIONS

In this dissertation I will retain the term 'learning design', in my methodology chapter, which introduces a methodological framework for design for learning, although I am well aware of the terminological conflict. I will also pursue the concept and principles of learning design in my methodological approach. My theoretical investigation and insights into networked learning, Web 2.0, PBL and learning design made me further define my research question(s):

- *"How can I conceptualise the scaffolding of teachers in planning and introducing 'new learning designs' combining PBL and Web 2.0?"*

I would further like to reflect upon the questions:

- *"What is the learning potential of integrating Web 2.0-mediated learning in a PBL approach?"*
- *"What kinds of challenges do teachers experience when integrating Web 2.0-mediated PBL-based activities into their practice?"*

I contribute to the research field by introducing a learning design methodology for scaffolding teachers that has advanced from an existing collaborative method. Further investigations will contribute to the different practices and specifications resulting from my research.

CHAPTER 3.

3.1. THE METHODOLOGICAL APPROACH

In this chapter I will introduce my methodological approach. I will build on the theoretical foundation presented in Chapter 2, and present action research as my primary methodological research process. I will introduce the collaborative e-learning design method (CoED) (Georgsen & Nyvang, 2007), which was my inspiration in the work in the EATrain2 project, but which also identified some challenges of using this method. As a result of these challenges I refined the method and chose to combine it with my action research method to compensate. I will also describe the workshop based on the CoED method, which was used to begin the empirical data collection. I will go further into how action research has been realised by introducing the three cases that emerged from the CoED workshop, and which I have been following. In conclusion, I will discuss my scaffolding of, and interactions with, the teachers from an action research perspective and describe the kind of data collected.

3.2. TAKING AN ACTION RESEARCH APPROACH

The research approach to investigating teacher integration of Web 2.0-mediated learning, combined with the idea of scaffolding the teachers in this process was initiated as an action research project. It was a method that could underpin my theoretical perspective. There are different approaches to action research, such as that of ethnographic action research (EAR) (Hartmann et al., 2009; Tacchi, Foth, Hearn & others, 2009), which builds on ethnographic principles, participatory techniques and action research processes. My research is not based on principles within ethnography, such as long term engagement with the site of study or building a research culture. I do not define my approach of action research within this field. Nor do I define my approach within the action learning definition, as action learning is more organisationally oriented and the fundamental idea is to bring people together to exchange and learn from each other's ideas (Kemmis & McTaggart, 2005; Pedler, 2011; Revans, 2011). Even though action learning has some interesting and relevant ideas, that are very close to those of action research (Zuber-Skerritt, 2001), which could assist the idea of scaffolding, I have decided not to take this approach. The teachers I collaborated with did not exchange experiences and learn from each other in another joint process to gain new knowledge for developing their next action in their individual processes. Action research on the other hand is a method, where actions can be taken by individuals to improve their practice, and where there is someone from the outside to act such as a facilitator. This method has often been used in the field of education for the purpose of changing teaching practices (Dick, 1997).

Kemmis and McTaggart (2005)have identified, described and discussed what they define as an eclectic mix of approaches to action research (Denzin & Lincoln, 2000; Kemmis & McTaggart, 2005). I will not go deeper into the different approaches in this dissertation but, on the contrary, try to describe my understanding and approach to the field.

My action research project followed the approach of Scandinavian-inspired action research, which is also known, in some contexts, as *interactive research* (Nielsen & Svensson, 2006) or as *participatory action research* (PAR) (Kemmis & McTaggart, 2005; Reason & Bradbury, 2008).

This approach means the researcher and practitioner(s) collaboratively enter into a joint learning process to initiate interventions in practice with the double goal of producing new theoretical knowledge and qualifying practice (Duus et al., 2012; McIntyre, 2008; Nielsen & Nielsen, 2010; Nielsen & Svensson, 2006; Svensson, Brulin, Ellström & Widegren, 2002).

The father of action research, Kurt Lewin (1997), generally defined the action research method as:

> *"[...] a comparative research on the conditions and effects of various forms of social action, and research leading to social action [...]. Above all it will have to include laboratory and field experiments in social change."*

> *(Duus et al., 2012, p. 26; Lewin, 1997, p. 144)*

Lewin's understanding of action research coincides with research and development at the Tavistock Institute of Human Relations (UK) and the National Training Laboratories (US) (Kemmis & McTaggart, 2005). From the social, educational and organisational action research approach Kurt Lewin found that different approaches to action research evolved over time, but that common to these was the idea of knowledge as gained in a shared realisation of the interventions (Nielsen & Nielsen, 2010).

In their book *Action Research and Interactive Research*, Nielsen and Svensson (2006) refer to a definition or understanding of action research, which the Danish Network of Action Research[10] hosted at AAU and has also presented:

> *"Action Research is understood as a scientific method for doing research. It underlines the connection between understanding and*

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[10] The Danish Network of Action Research's web page www.aktionsforskning.dk where there are conferences and PhD courses within the area of action research.

change, between theory and practice, and an active co-operation between researchers and the participants in the production of new knowledge."

(Nielsen & Svensson, 2006, p. 14)

Both these definitions of action research build upon strong collaboration between the researcher and the participants involved in the interventions that are encountered in the action. I found the same approach in *The SAGE Handbook of Action Research* (Reason & Bradbury, 2008), where a huge collection of theoretical and methodological approaches to action research is represented: they generally describe action research as practices where people act creatively to change pressing issues in their organisations or communities. Action research involves calling for engagement *with* people in collaborative relationships and joint interactions, where dialogue and development can arise. There is thus a focus on collaboration and joint engagement, from which new knowledge arises both individually and collectively. This idea of social interaction leading to new knowledge is in line with the way pedagogy and learning is defined by, for example, Lave and Wenger (1991) who talk about learning taking place when participating in social interaction with others (communities of practice (CoP)) building on learning from a social constructivism perspective. Much collaborative and cooperative learning thus seems to go on between participants using action research as a method. Interaction and the production of new knowledge as an essential part of action research is also reflected in the scaffolding approach based on ZPD by Vygotsky (1978), as presented in Chapter 2.

In my research project, 'action research' means that the practitioner and researcher are involved in a joint learning process as "co-researchers", who seek to integrate their diverse theoretical and practical knowledge in the development of interventions, experiments and changes of practice, learning from each other and from others' practices along the way, and together implementing and evaluating the experiment in preparation for new experimental interventions (Dohn, 2008; Nielsen, 2012).

In the process of action research, it is important to note and build upon, the knowledge of practitioners, as they have an important insight into their own practice, which gives them an understanding of, but also the ability to evaluate, the scope and implications of suggestions for interventions in their teaching practice (Dohn, 2008). On the other hand, the researcher has knowledge of relevant theoretical perspectives, of other cases described in the literature, and of different kinds of research methods. The researcher can also look at practice from a less involved perspective and engage in dialogue with the practitioner in the role of "asking clarifying questions". Altogether, these situations give the researcher a chance to identify "blind spots" in a teacher's practice, but also to support or scaffold them in developing new ideas. Accordingly, this kind of collaboration can

supplement, challenge and evaluate the understanding of practice for both practitioner and researcher, and of ways of transforming or intervening in practice, and eventually developing shared perceptions of practice.

As a researcher, I have several advantages when taking the action research approach. For example, it is possible to explore what does not yet exist and examine things that unexpectedly arise. In other words, the researcher is not limited to studying already existing practices but is able to focus on what happens when intervening in and qualifying practice into new practices. This especially gives me the opportunity to explore what happens when teachers combine Web 2.0-mediated learning with a PBL approach, and furthermore to scaffold teachers in the development of learning designs in this regard. I can scaffold them in their process of learning, for example in new technologies or ways to navigate with Web 2.0 for supporting the activity that they integrate in their teaching. Building on the researcher's and practitioner's combined knowledge, it will be possible to initiate activities that could support the development of successful new practices and produce new knowledge that makes it possible to investigate the extent to which this new practice actually becomes a success, and which factors enable or prevent this. Through ongoing dialogue between researcher and practitioner, combined with minor adjustments in the process, they can reach a shared, but hopefully not too involved, understanding of the practice as is, of the initiated interventions, of the results, of the consequences, and of possible future improvements to the activity.

As Dohn (2008) also stresses, a researcher needs to have a "knowledge of practice" to be able to evaluate the "knowledge of practice", but also to be able to contribute with appropriate suggestions for changes and thus be able to scaffold teachers. An "insider's" knowledge of practitioners allows a more nuanced evaluation of the success of the intervention than will in general be possible for an outsider, but on the other hand the researcher will be able to keep some kind of distance from the practitioner's practice, which allows them to make a less involved, less biased evaluation than will in general be possible for the practitioner.

Although the researcher will be more distanced from practice in relation to the practitioner, there will be the opportunity to be more involved in the intervention(s) than in the other types of naturalistic research approach (observations, ethnographic methods, etc.). The more the practitioner and researcher succeed in becoming co-researchers in a joint learning process, the more committed the researcher will become to the project and to the practice itself, and therefore the less neutral they will be in their evaluation and the more "blind spots" could occur.

Action research from a Nordic perspective has used a variety of methods – experimental design, stage settings, participant observation, interviews, surveys, dialogue/conferences, research circles, etc. – and qualitative methods have become dominant in this kind of research (Nielsen & Svensson, 2006).

Action research also concerns knowledge, and not only new practical knowledge but also the ability to create knowledge. It is important to note that the process of research or inquiry can be just as important as the outcome (Reason & Bradbury, 2008). The process is an iterative one; building on action is knowledge created and based on the analysis of the knowledge gained it may lead to new forms of actions (Gaventa & Cornwall, 2008). Practicing good action research occurs when it emerges over time in a developmental process (Reason & Bradbury, 2008).

In the current action research project I, as the researcher, have theoretical knowledge about learning, and both PBL and Web 2.0 pedagogics, and qualitative research methods. The practitioners, all of whom are university teachers, have knowledge about the content within the courses they teach. It is possible they have teaching experience from similar courses with similar groups of students, and some theoretical knowledge of the PBL pedagogy at AAU, but also a practical pedagogical knowledge in general. Together we therefore had some common ground in this action research project, which significantly advanced our means of collaborating but also led to a shared understanding of each other's perspectives.

There is a clear correlation between my research questions, my theoretical perspectives and the methodology chosen. Some of the key words are collaboration, learning, knowledge, interaction and design for learning, which also recurs in my theoretical and methodological approaches. To begin my empirical data collection and my action research project I took a point of departure in the CoED method (Georgsen & Nyvang, 2007; Ryberg et al., 2015), of which I had different experiences working in other projects, and which I will return to in the next section. The CoED method frames the scaffolding and design for learning approach, and underpins the key words noted above.

3.3. THE COED METHOD AS INSPIRATION

The EATrain2 project was a springboard for elaborating on my methodological approach within learning design. During the EATrain2 project I collaborated with colleagues from eLL with a view to developing a methodological framework for working with Web 2.0-mediated learning within enterprise architecture. Our research in the EATrain2 project builds on reviewing literature about the use of Web 2.0 in an educational context, but also looking at the tensions in Web 2.0 educationally, versus Web 2.0 ideologically.

As part of the project we conducted a workshop using the CoED method (Georgsen & Nyvang, 2007), which we tried to modify accordingly to the Web 2.0 mediated learning approach, and this became my inspiration to scaffold teachers in my own research. I have further elaborated on this in Paper II *"Scaffolding Teachers Integrate Social Media Into a Problem-Based Learning Approach"* (Buus, 2012). CoED builds on the philosophy of collaborative learning design, focusing on the

early stages of the design process and tangible designs. CoED draws upon three fields of research; *system development* – as designing *for* ICT, *collaborative learning* – as designing for both learning (practical design for learning) and to learn (collaboratively construct knowledge) in the design process, and *facilitation of creative processes* – aiming to develop something new or to modify a teaching practice (Georgsen & Nyvang, 2007, p. 5). Seen together with the core of PBL and networked learning, combined with scaffolding and action research, this method seems to be a supportive approach.

Based on the field of system development we need to facilitate a learning process that takes place in a non-linear way (Beyer & Holtzblatt, 1997; Dahlbom & Mathiassen, 1993) and involves different stakeholders in an iterative process in its making of a prototype. Involving different stakeholders from different domains enables a foundation for knowledge creation, the negotiation of meaning and collaborative learning (Wenger, 1998). When facilitating the more practical thinking, different creative methods can be considered, such as cards sorting and future workshops such as that suggested by Georgsen and Nyvang (2007). Card sorting is a user-centred, simple and low-tech creative process involving a group of people in, for example, designing or testing usability, and the like. The process illuminates the tacit structure of people's mind-set according to, for example, pedagogical values, design, and processes (Gaffney, n.d.; Hudson, 2014; Spencer, 2004). The future workshop approach is also based on a collaborative process in three phases (critique, fantasy, and realisation). The method was originally developed by Jungk and Müllert (Jungk, 1987; Jungk & Müllert, 1987). The method uses a user- and action-centred approaches, where the final result will be a negotiated realistic suggestion for changes in, for example, the way of teaching or whatever subject initiated the workshop (Drewes, 2006). Inspired by these three research fields, the CoED originally was designed accordingly.

I find that CoED is methodology combining the perspectives of learning design, such as in dealing with creativity, planning, collaboration (interaction), and processes in the design for learning, and that it connects with my perspectives on scaffolding and my action research approach, in its methodological approach (Drewes, 2006).

As part of the EATrain2 project we elaborated on the CoED method, which was originally developed by Marianne Georgsen and Tom Nyvang in 2007 as part of the Learn@Work project. We also identified challenges in relation to the enhancement of the methodology, including:

- How to adjust to different domains;
- How to support and facilitate the process for groups with an unbalanced mix of pedagogical, technological and domain- or content-related expertise;

- How to design for successfully communicating the results of the design workshop to relevant stakeholders, who need to act upon the outcome;
- How to challenge both experienced and inexperienced practitioners to pave the way for change; and
- How to create and consolidate a more sustainable learning design.

We also adapted the method in order to integrate a Web 2.0-mediated learning perspective enriching the learning design approach (Buus et al., 2010; Glud et al., 2010). We based this development on the questions relating to control that evolved from the literature review about PBL and Web 2.0, and that were elaborated in the article "*Identifying Differences in Understanding of PBL, Theory and Interactional Interdependencies*" by Ryberg et al. (2010). Overall we elaborated on the model and incorporated Web 2.0 ideals into this view of PBL, combined with the question of "who is in control of the process – teacher or learner?" as the view on control relates to teacher-centred vs. learner-centred perspectives.

Figure 5 is an attempt to illustrate this. This illustration represents four continua – learning processes, motivation, infrastructure and resources/content - between teacher and learner, that are to be considered when designing for learning from a Web 2.0-mediated learning and PBL perspective (Buus, 2012; Glud et al., 2010).
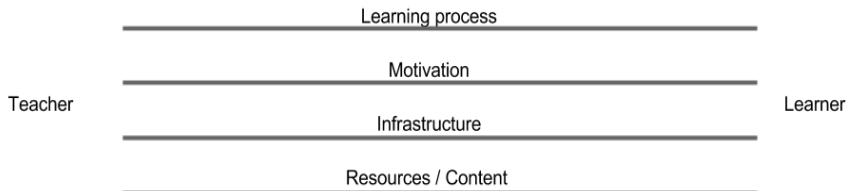
Figure 5: Continua dealing with the notion of "control" between teacher and learner, which needs to be considered when designing for Web 2.0-mediated learning.

Based on this continuum, we generated some questions, as illustrated in Table 1, to support learning designers (e.g. teachers) in their designs for learning. The questions also needed a focus that provokes ideas about tensions, which need to be reflected upon as a designer in the learning design process.

We pointed out the importance of considering whether the motivation for integrating Web 2.0 mediated learning activities into teaching practice were based on a motivation to fundamentally change the learning approach or use it to partly change an already established learning approach. The teacher I worked with in my research used integration for the second option, as they already taught within an active learning approach, and used integration to encourage and activate the students even more in their teaching and their learning.

Table 1: Reflective questions regarding the implementation of Web 2.0-mediated learning.

The learning process:
Who controls the learning process?

- Who defines what is to be investigated?
- Who decides how this should be investigated?
- Who will perform the activity?
- Who decides the flow and structure of the learning processes?
- How are the learning processes organised?
- Who controls the collaboration?
- How is the collaboration organised?
- Is it formal and/or informal?

The motivation:
Who controls the motivation?

- Is the motivation externally or internally driven?
- To what extent should/can the students be self-motivated?
- To what extent is learning in itself motivating?

The infrastructure:
Who controls the infrastructure?

- Who provides the infrastructure?
- Who provides the tools?
- Who owns the tools for production?
- Who organises the tools?

The resources/content:
Who controls the content/resources?

- Who makes the resources/content available?
- What strategies (copy-paste or rip-mix-burn) are supported for creating resources/content?
- What resources/content is it possible for learners to create?
- Who defines the different roles related to competence, expertise, authority, accountability and copyright?
- Who has the competence/expertise?
- Who has the authority?
- Who is accountable for the resources/content?
- Who holds the copyright to the resources/content?

We used all these ideas to elaborate on the original CoED method, and you will find some more detailed descriptions in Buus et al. (2010) and Ryberg (2013), of the process and the results from the workshop in the EATrain2 project.

I used this elaborated CoED method as the foundation methodology for the initial workshop conducted for the teachers at the Faculty of Social Science as part of my research (Buus et al., 2010; Buus, 2012). In addition to the EATrain2 project I also participated in other projects[11] where CoED had been introduced to begin initiatives for changes in teaching and designing for learning, but it came to light that the method needs to be adapted according to the challenges identified and a coherent methodology (Ryberg et al., 2015). I realised that the participants needed to be assisted by further actions and additionally scaffolded in these actions, and therefore I decided to combine CoED with my action research approach to initiate and inspire teachers participating in my action research project. CoED is a methodology for designing learning support, strengthening and inspiring teachers in new ways of thinking for their practice, giving them tangible designs based on collaboration, negotiation and active participation in the design process, and the ability to learn from each other and be mutually inspired, but it is not a methodology that can stand alone.

As Lewin (1946) and Goodyear and Dimitriadis (2013) also stress, and as my experiences highlight, even a good workshop challenges the long-term improvement and sustainability of change in participant practices. Thus participants need scaffolding to cope with this transformation and these changes, and even in this situation there is the potential of not being able to sustain the new design for learning, integrated with guidance and support. This is one of the distinctive elements of scaffolding and design for learning. In order to succeed in the design for learning in a sustainable and successful way, it is important to provide support or scaffolding, and even scaffolding with the possibility of redesign, based on experiences and new ideas (Goodyear & Dimitriadis, 2013), which the action research approach is able to handle. In combination with the CoED method, this seemed to be a good point of departure for my empirical research.

3.4. ACTION TAKEN

Inspired by Kurt Lewin's model and experience in action research (Coghlan, 2005; Lewin, 1946, 1997) and Edgar H. Schein's elaboration of this model (Schein, 1987, 2002), I envisioned my research process as three actions. Lewin talks about *unfreezing – changing – refreezing* as the three steps in an action research process. Based on these terms, other ways of describing the process have emerged, and are

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[11] E.g. a project for UC South Denmark, where we also used CoED to inspire teachers using Blackboard for teaching, and also a project collaboration regarding ICT4D, where we used CoED to inspire the development of courses for PhD students.

illustrated in Figure 6 (Wikipedia, 2014b). Kemmis and McTaggart (2005, p. 276) describe the action research process as a spiral containing *planning* (a change), *acting* and *observing* (the process and consequence), *reflecting* (on the process and consequences), *replanning*, *acting* and *observing* (again), *reflecting* (again) and so on. Their process is also reflected in the model below in *planning, action* and *results*. My own terms for my action research process are in bold, italics and grey.
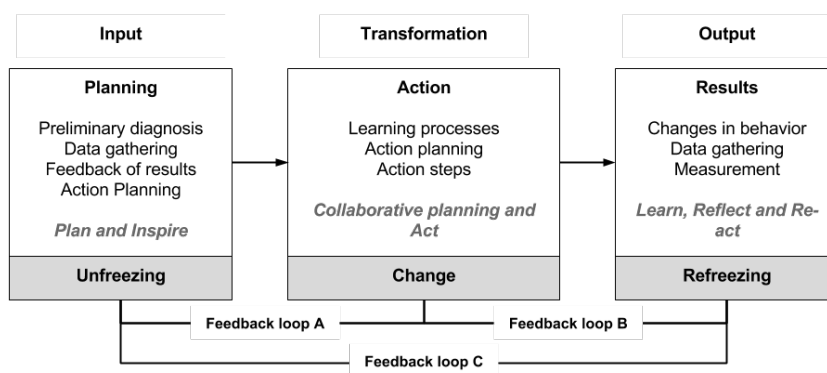
Figure 6: Model of the process in action research with my own process added in bold, italics and grey.

The first step in the process is to obtain input and develop a plan. In this process it is important to motivate for change, and this motivation could start with an idea, which could be discussed and elaborated upon in order to concretise the objectives of the change. This leads to an overall plan and the first action taken, for example inviting the teacher to an initial workshop (see also Figures 7 and 8 for an elaborated and illustrated model of my action research process).

The next step is the transformation process where the change activities take place – teachers participated actively in the initial workshop, from which the three cases emerged and activities were accomplished in the teaching practice – and mutual learning occurs in the collaboration between researcher and practitioner. In this process the scaffolding of the teachers becomes essential so as to take action on and accomplish the ideas and initiatives of the learning activities initiated by the teachers in the planning process.

The third step initialises reflection on the results, observations, new concepts and lessons learnt, so as to be able to adjust the activity for improvement in the next iteration. This happened in a joint process between the individual teachers and the researcher. In the following sections I will explain in more depth my action research process and the cases that emerged from the workshop.

3.4.1. INVITING TEACHERS TO PARTICIPATE IN A LEARNING DESIGN WORKSHOP

Initially the initial workshop was intended to be in the autumn of 2010, but due to private circumstances it was postponed, and was therefore was conducted in spring 2011 (see Appendix A).

To this workshop I invited teachers from the Faculty of Social Science who were both experienced and inexperienced in Web 2.0-mediated learning, on order to reflect on their teaching practice and further design for Web 2.0-mediated learning. The choice of the faculty was based on knowledge about the process they adopted in integrating an e-learning platform (Moodle) in 2009–2010, and from this process collaboration was established with different teachers. Most of them were given an introduction to the use of Moodle (Buus, 2015). Twelve teachers signed up for the workshop out of the approximately 160 who were invited, and of these, seven participated in the workshop.

The workshop had a duration of six hours, and was divided into three phases; 1) inspire and create a focus based on presentations, 2) identify the pedagogical value of design in a collaborative card sorting process, and finally 3) collaboratively work on a more specific learning design (see Appendix B for the programme and Appendix C for the value and design cards).

Picture 1: Collaborative card sorting – value cards

Picture 2: Intense dialogue in the learning design process
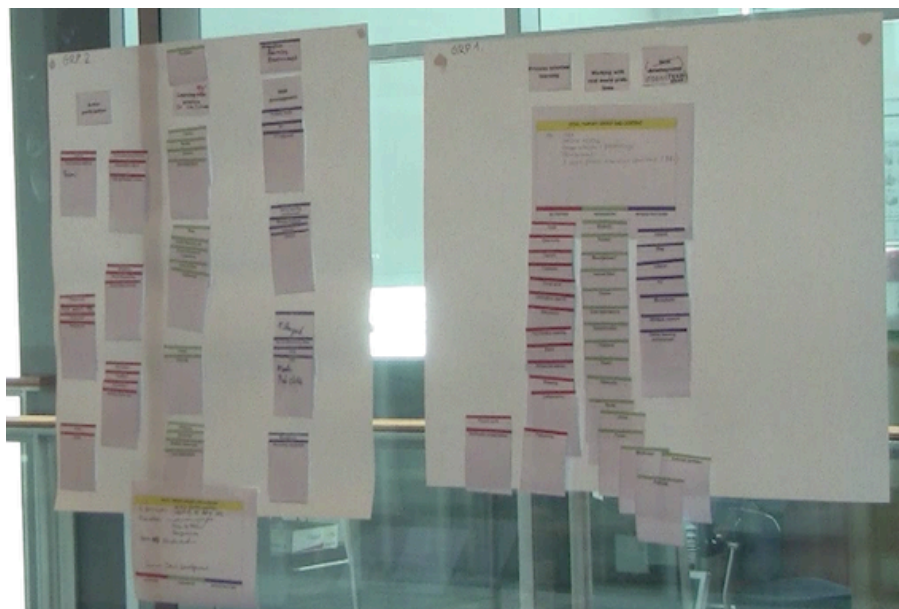
Picture 3: The two learning designs as a result of the workshop

The workshop is described in more detail in the upcoming book *Art and Science of Learning Design* (Maina et al., 2015), as are two other projects also using CoED in a shared chapter "*Introducing the Collaborative E-Learning Design Method (CoED)*" ((Ryberg et al., 2015).

The workshop was followed up with the opportunity to interact with the teachers to gain an impression of how to initiate such activities, how Web 2.0-based activities

influence PBL, and their role as teacher or facilitator, among other things. Participation was voluntary, as was participation in the further process illustrated in Figures 7 and 8. Due to not having a fixed number of teachers and looking into the many different activities initiated, I followed three cases inspired by the workshop.

3.4.2. FROM COED TO MY EMPIRICAL RESEARCH

One of the drawbacks of this method is bringing the prototype or the learning design into practice and into the more sustainable parts of teaching (Ryberg et al., 2015). In my further work with this method I therefore extended the method itself by applying it as part of my action research project so as to be able to follow and scaffold the teachers in their attempt to integrate Web 2.0 in practice. This process in my research methodology is illustrated in the model below (Figure 7) (Buus, 2012).
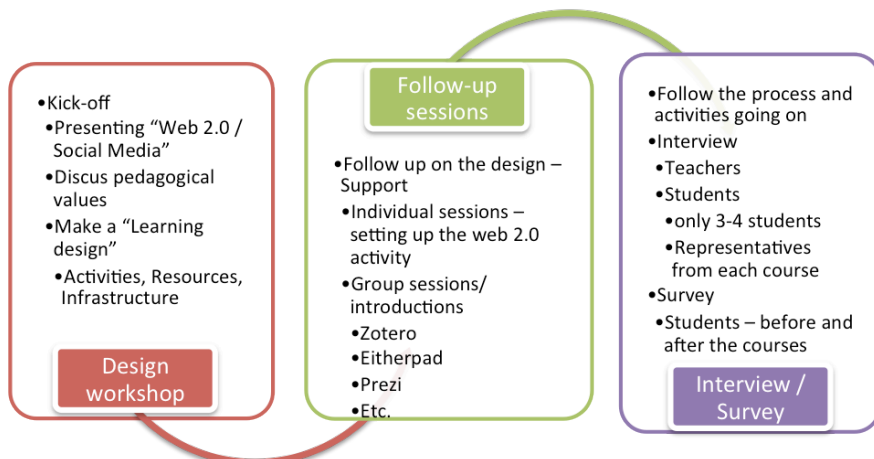
Figure 7: The intended research methodology based on experiences and assumptions from former work with CoED and taking into consideration the challenges in the method.

After the workshop and during the process of collecting my empirical data I realised that there was no need for small group sessions and deeper introductions to Web 2.0 tools for the teachers. The actual learning design that evolved in the workshop was not one that the teachers actually integrated, but instead took advantage of their own ideas in their teaching context. I thus slightly changed the process for conducting the "follow-up" sessions, and instead had more individual sessions with the teachers and facilitated them technologically and pedagogically based on their ideas for the activities they wanted to initiate in their teaching (see Figure 8).
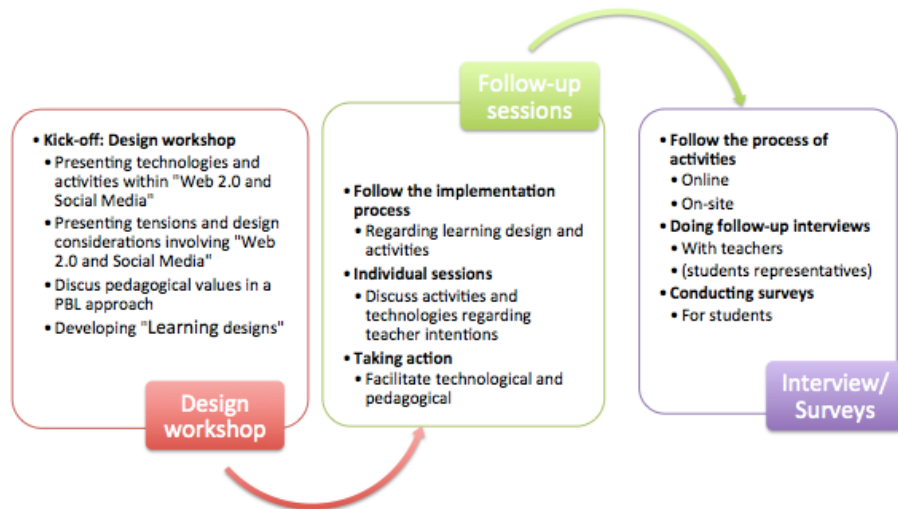
Figure 8: How the process of the empirical data collection and the methodology of my research were accomplished.

The activities initiated were followed both online and on site, depending on the case and the teacher, which I will explain further at a later point. Further follow-up was in the form of informal dialogue during the implementation, followed up by individual interviews with the teachers in order to obtain their perspective on initiating and participating in Web 2.0-mediated educational activities. A survey for the students was also conducted in two cases.

My empirical research was a continuation from the CoED workshop, as I invited the teachers to engage in further interventions by participating in my action research project and to thus gain further individual scaffolding for the integration of Web 2.0 mediated learning activities.

CHAPTER 4.

4.1. THE THREE CASES

Following on from the workshop, three teachers stayed in contact for further intervention in their practice so as to establish some Web 2.0-mediated activities in their teaching practice. Based on their involvement, three cases were considered for investigation. These cases all took place in a blended learning environment (on-campus studies), and in the AAU pedagogical context of PBL in course work, where web-based tools and e-learning platforms are used to complement lecture time using Moodle as the virtual learning environment (Buus, 2015). In this chapter I will introduce the three cases that are the foundation of my empirical research. I will introduce the data I collected and my approach to dealing with this data, as an introduction to my further analysis.

4.1.1. CASE 1: USING BLOGS FOR CASE DIALOGUE

An idea emerged from the workshop in which the teacher intended to integrate an activity supporting collaboration, the negotiation of meaning and sharing knowledge using blog functionality to encourage students to participate and engage in both written and spoken dialogue in a case-oriented theoretical reflection process during lectures. I was actively engaged with the idea of this learning activity and had initial meetings with the teacher about planning the activity and the process. This gave me the chance to follow its development, implementation and evaluation during the 2011 autumn semester, as part of my empirical data collection.

In this case there were approximately 130–140 students divided into two equal-sized groups (Group X and Group Y). This meant a course lecture would contain approximately 65–70 students. The course consisted of eight lectures in each group, and the lectures were provided on the same day with just a short break between the two groups. Different activities were built into the course in which the students needed to actively engage. Initially the teacher had the idea that the two groups should be presented with two different ways to do the writing. One group had to use a forum in Moodle and the other had to use the blog function in Moodle, but the blog function was individualised and did not (at that time) support the group-shared intention of the teacher. Both groups were thus provided with the same opportunity, using a forum in Moodle for the blog.

Figure 9: The forum used in Moodle as a "blog". Only the teacher I followed used this "blog" activity as part of her teaching in the teacher team of the course.

The students within each group (X or Y) were further divided into subgroups and given some reflective questions in the blog based on a theoretical approach presented in the lecture and analysed in connection with a case. The teacher started the blog with a short forum post repeating the question, which the students had to reply to with their own reflections. Time was allocated to the students for this case-based group work during the lecture, and they were asked to use the blog to write up their shared group perspective and reflections on this blog. In a plenary session the teacher then tried to highlight some of the perspectives that had come to light from the group work.

One thing that differed from the oral presentation of the group work was that groups each posted something in written form, and it became difficult to go through all groups within the period of the lecture. The aim of the lectures was furthermore to practise a collaborative approach to knowledge sharing, and thus support the students in gaining an understanding of what knowledge sharing means and what kinds of benefits students gain when engaging actively and collaboratively in this activity.

The course finished with a two-day workshop, with all students in both groups participating. The use of the blog during the lectures was intended to lead up to this workshop where the blog would be used as an online environment showing different theoretical aspects of a shared case and to discuss these different theoretical issues on the blog. By contributing their different case analyses to a collaborative platform, the differences between the theoretical approaches (and their practical implications) became perspicuous.

The course was to have finished with this two-day workshop, but astoundingly the students asked if they could use the blog for another week to ask questions and make remarks on the theories and case reflections. The teacher accepted this for another week, but there were only a few comments during this period. The primary activity after the workshop was finishing and sharing the results, and the teacher commented on the posts.

As part of one of the final lectures, the teacher evaluated the blog activity and discussed how the students felt about using the blog for casework in lectures. The students were in general positive about this. They felt that the blog was a good repository for their exam preparations, so they found it very useful in general. I had a follow-up interview with the teacher to hear her thoughts on how the activity had progressed.

4.1.2. CASE 2: UNLIMITED SUPERVISION IN AN ONLINE ENVIRONMENT

Another idea that emerged from the workshop dealt with the meta-level, with collaborative processes and knowledge sharing in smaller and larger groups. My research and empirical data collection in this case are based on two iterations of the learning activity – one in the autumn of 2011 and the other in the autumn of 2012. Prior to both iterations I met with the teacher to plan the activities and any adjustments to them for the second iteration.

This course was a five-week intensive course with daily lectures around topics supporting the group work, which were also included in this course. The course was evaluated based on small group reports, which were handed in at the end of the fifth week. The reports were based on data collected from a questionnaire – which was also developed and distributed – and which need to be reported on during this period of time. The students were introduced to a Danish company, with whom they were to collaborate. The collaboration consisted of elaborating and conducting the questionnaire, collecting and analysing data, and giving feedback to the company.

The course is made up of international graduate students coming from different educational backgrounds and cultures. Furthermore, they are not necessarily experienced with PBL, and definitely not the Aalborg PBL model. Among the international students there are also Danish students brought up in the AAU pedagogical tradition. Often two-thirds of the students are international students attending this masterclass. The Danish students have an important role in the integration of the international students into AAU pedagogy, but are also active in the translation of the material, for example the questionnaires used in the course.

This case actually consists of two activities in parallel, and both activities were conducted in both iterations. I will start by presenting the main activity (Case 2a), which began the unlimited supervision offered to the students in relation to a small group project within the course. Normally supervision takes place in face-to-face sessions with a set amount of time for supervision, and does of course take place during lectures, as these are aimed at supporting the group work. In this activity supervision is not provided face-to-face, but is provided using a blog/forum/group feature, which also aims to support sharing and collaboration among students in the class.

The intention of the teacher was to make students aware through the activity that collaborating can be beneficial when learning things, in the same way as knowledge sharing and group discussions enable a student to learn more than they would learn on their own. This could also lead to students delivering a better project report. The teacher also stressed that he intended to support sharing and collaboration during the lectures in order to promote an educational-related community of practice among students (Wenger, 1998).

As noted above, I followed this case in two iterations. The first iteration had 76 students from more than 20 different countries. In the first lecture the students chose the online environment in which they would like to be supervised. They could choose between a Moodle forum and a closed Facebook group, and from a show of hands the majority chose Facebook. Based on this choice a closed Facebook group was established during the first lecture with a couple of students as administrators. The teacher and I were of course invited into the group as well.

During the first lecture the teacher also stressed that the intention was that when a student posed a question one of the fellow students would have to answer before the teacher replied. The students were required to indicate in their final projects how many new posts, contributions or comments each of the group members had made on Facebook. This was to encourage the students to engage and contribute on the virtual platform, even though their degree of commitment and participation would not count towards their final grade, since there was no foundation for this kind of activity in the study regulations. After collection of the questionnaire data, the students had ten days of unlimited supervision before handing in their group projects and attending the final exam.

The second iteration had 90 students, with a combination of international students from different countries: primarily Eastern countries such as Rumania and Poland, but also around a third of the students were Danish. The conditions for the activity changed in that the students also had the option to choose an online platform for the supervision, but the established Facebook group created on the student's initiative prior to the course was integrated into this iteration at the request of the teacher. Another condition was that the teacher initiated improvements in this iteration based on experiences from the first iteration, which was to start the supervision process during the first lecture, but stressing that students were very welcome to post questions or reflections straight away.

The set-up changed over time during the period, as others in the teacher team were invited into the Facebook group and took part in the discussions there, in order to answer methodological and theoretical questions. The director of the external Danish company involved in the project was also invited to participate in the Facebook group. The involvement of the teacher team and the director gave the

students more opportunities to ask questions and to follow up on ideas or designs in the process than were available to students in the first iteration.

Finally, I will briefly present the second activity as part of this case (Case 2b). This activity deals with introducing the students to two Web 2.0 tools for sharing and collaboration, which were aimed at supporting them in their sharing and collaboration as a whole group and as smaller groups, so one could ensure that this activity would underpin the main activity. In this case, because of my knowledge of these tools, I was asked to give a short presentation on the Web 2.0 tools and illustrate their use. The tools presented were Diigo[12] (a social bookmarking tool) and Zotero[13] (a social reference tool) as examples of similar tools, which could benefit students in collaboration, both on courses and in project work.

As a follow-up to both iterations and in relation to both cases, a small questionnaire was given to the students. In the questionnaire I asked them about their use of Diigo and Zotero in order to get an impression of whether the short introduction to these tools would encourage the students to integrate them into their practice, but the response to this questionnaire was poor. Most answers regarding Zotero and Diigo referred to the short amount of time for the mini-project and that there had therefore been no time to get to know about Zotero, which was the most popular tool, but there was also a comment about not being willing to share material with others. Within both iterations only two students had integrated Zotero, and found it useful and uncomplicated to use.

I further asked for their opinion on this means of supervision, and there were very different opinions in response. Some students found that it was a good, fast and easy way to get answers to their questions, some felt the information was too superficial, and others that there was a need for at least one-hour meetings or some kind of face-to-face group interaction with supervisors, and that all the professors and supervisors should be part of the Facebook group to make it work better. In the first iteration only 19 students gave feedback, and in the second iteration 37 students replied. I conducted interviews with the teacher to follow up on the iterations and used the questionnaires as background knowledge for the interviews.

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[12] Diigo is a tool for bookmarking, which can be individual or group related. Groups can be project groups or research groups. It can be accessed from anywhere, as it is cloud-based. It is therefore defined as a social bookmarking tool. www.diigo.com

[13] Zotero is a tool for building your own cloud-based reference library. It enables groups to be established within the library, where students/authors can share/access references, for example when writing an article or doing a project. www.zotero.org

4.1.3. CASE 3: GIVING STUDENTS THE CHANCE TO COMMENT ONLINE ABOUT LECTURES AND CONTENT

The last idea that emerged from the workshop gave first-year undergraduate students the opportunity to ask questions, agree on questions for others, and make comments on theoretical perspectives or difficulties during lectures. The intention of the teacher was to integrate Web 2.0-mediated technology to make this activity possible synchronously and online during lectures. This would give her an idea of where the students were experiencing problems with the theory and methods introduced during the lectures and she would then be able to follow up on these issues in the next lecture.

I was particularly lucky in this case in that I had the chance to follow the third iteration during spring 2012 in the development of this activity. The teacher had already had one iteration before being introduced to Web 2.0 technologies, and therefore her first iteration was not based on technology and only used pen and paper. With approximately 200 students this led to a lot of paperwork, and was very time-consuming.

In the second iteration the teacher contacted me to get inspiration to use some kind of Web 2.0-mediated technology that could help her gather information electronically and during lectures on the experiences students face regarding problems with theory and methods during lectures. I have to stress that at that time I hadn't conducted the Web 2.0 workshop, and therefore my role was in relation to my role as e-learning consultant, as I had not started the process of collecting data for the PhD.

In collaboration with the teacher we found that the use of Etherpad[14] could make gathering information possible, and the teacher tried implementing this technology. This activity was set up rather late in spring 2011, which presented challenges in its implementation. We tried different Web 2.0 technologies before finding Etherpad, and therefore the students did not really engage in the activity as intended from the perspective of the teacher. In my interview about the teacher's first two iterations, before I had interacted with her as researcher, she stressed that this late start in the second iteration might be the reason for the lack of engagement by the students.

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[14] Etherpad is a Web 2.0-based tool giving multiple people the opportunity to edit the same document simultaneously. Changes are instantly reflected on everyone's screen. It is to be used as a way to write collaboratively (www.etherpad.com). Google now has the same facility in its Google Docs.

In the third iteration, in which I was more closely involved, 170 undergraduate students attended. I met with the teacher before the start of the semester and together we planned to give the students the opportunity to choose between Etherpad and a closed Facebook group. The reason for this choice was based on the teacher's experience combined with my own experiences in another case. When introducing the activity in the first lecture, the teacher stressed that the two Web 2.0 technologies would have different possibilities, and based on these possibilities the student needed to make their choice. If the students chose Etherpad, they would be anonymous, whereas with Facebook it would be possible to identify them by their profile. The majority of the students thought a closed Facebook group would be the best platform, and therefore this was arranged and established in the first lecture. Some of the students were chosen as administrators, and I, together with the teacher of course, was invited to participate in the group. The teacher created a "professional" profile on Facebook, following a discussion with myself, to avoid the use of her private Facebook profile.

I followed both the lectures and the online activities going on. I issued a questionnaire to the students that could be accessed both through Moodle and the Facebook group. In the questionnaire I asked about their use of the Facebook group and what they found to be good and less good about integrating it in lectures. The responses from the students were mostly positive, and they felt that this way of using a Facebook group for questions and dialogue was very effective. Some students simply "lurked" and others used it actively for both questions and replies. The students were positive about getting feedback from both fellow students and teachers, and all the students in the questionnaire said that they felt the teacher's presence in the Facebook group, but a few commented that they would like the teachers to be even more active and reply more quickly to questions. Some of the things the students found problematic were that anonymity was not possible on Facebook, students not using Facebook could not participate in the dialogue, and the number of postings might become confusing and time-consuming. In total, 52 students replied to the questionnaire. I conducted a follow-up interview with the teacher both prior to the third iteration to understand the other two iterations and after the third iteration.

4.2. SUMMING UP MY EMPIRICAL FOUNDATION

The way the action research was carried out was different in the three cases, for example in one of the cases I followed two iterations of the implementation. My involvement differed partly according to differences between the teachers as to the degree of technological and pedagogical facilitation they wanted and partly regarding the differences in the concrete activities undertaken. According to scaffolding it can be seen as different levels and the kind of facilitation needed in each case.

The teachers, who individually came to me as the researcher presenting the activities they wished underpinned by Web 2.0 technologies, formulated the objectives of the case studies. The objectives in the cases originated from different purposes, as one teacher wanted to try out an idea, another intended to give students the flavour of digital scholarship and make them aware of the benefits of knowledge sharing, and the third wanted to make the 'students chance of commenting' process electronic and still use the students comments to adjust the teaching.

The points of departure for the teachers were based on little knowledge about Web 2.0 mediated learning activities, and an interest and ideas initiated by the initial workshop. They had little knowledge about the technological approach needed to support their ideas, which involved different methods in the scaffolding process. Some teachers needed more facilitation than others, and the roles of the teachers and myself as 'scaffolder' or researcher, differed in all three cases.

In the first one (Case 1), I participated very actively in the pedagogical and technological scaffolding of the Web 2.0-mediated activities. I furthermore attended all the lectures held by the teacher, held informal conversations with her about the progress of the activities, and also facilitated her in making minor adjustments along the way. The project was thus developed as co-research and co-participation to a high degree, but above all was initiated from the idea put forward by the teacher.

In Case 2 I had the opportunity to follow the teacher initiating the Web 2.0-mediated activity twice. In the first iteration I held several discussions with the teacher prior to the course, when planning the activity, but I only participated in the first introductory lecture and the final and evaluating lecture. I did not attend the face-to-face learning activities between these lectures, but followed the activity in the online environment. Before the interview with the teacher I therefore had an overview of the online activities that had taken place. I was mostly involved in the initiation of the Web 2.0-mediated activity, but not in its facilitation as it unfolded. I thus did not become a co-participant in this first iteration, nor did the teacher become a co-researcher to the same extent as the first teacher.

In the second iteration in Case 2 the teacher and I again had an initial meeting, and we held dialogues about other kinds of activities the teacher felt inspired to integrate, however, the final idea was to stick to the first initiated activity (unlimited supervision in an online environment), and adjust it from the teacher's perspective by being more active in initiating dialogues. This adjustment was based on reflections during the first iteration. The teacher stressed during the introduction to the students that supervision would take place throughout all five intensive weeks. I observed the online sessions that took place and held informal dialogue with the teacher according to the interactions taking place online. I participated in all the lectures and between lectures I held informal talks with the teacher, where we talked about, for example, what the students did during lectures, such as accessing

Facebook, playing games, surfing different web pages, but also writing notes etc. We also discussed possible adjustments, which were very much based on ideas generated by the teacher and our dialogue. In this iteration there was more collaboration during the activity and this interaction between the teacher and myself made us more like co-researcher and co-participant than in the first iteration of this case.

Case 3 began with my conducting an interview with the teacher to be updated on the activity she had set up, and in which I had been involved as e-learning consultant. To my surprise it turned out during the interview that she had undertaken the non-technical activity as the first attempt at this learning activity. The interview was followed by a planning phase for the next iteration of the activity, where we discussed the different possibilities for underpinning the activity in this third iteration. I attended all the lectures together with the follow-up and gathered data from the online environment that was set up. After the lectures I had informal conversations with the teacher about what happened online in general and, for example, during lectures if the students commented or wrote online. There were few adjustments during this activity, and therefore the relationship is difficult to define as co-participant and co-researcher, but at the same time we held dialogue about the process of the activity, and therefore I would argue that we established this relationship after all. There was no need for adjustments as such.

With regard to my first research question, where I asked *"How can I conceptualise the scaffolding of teachers in planning and introducing 'new learning designs' combining PBL and Web 2.0?"* I find this collaborative methodology based on combining the action research approach with the CoED method rewarding. A certain kind of relationship was established between the teachers as participants and myself as the researcher, building on mutual dialogue, inspiration and knowledge exchange during the design and integration process of the activities. We exchanged observations and reflections on the online interactions taking place, and based on this made various adjustments to create an improved learning environment for the students to interact in. The more technical support also helped the teachers cope with the technical barriers, and I know that the teachers have carried on the activities, because I have supported them in my role as e-learning consultant. At the same time it is important to note the different levels of power-relations that also occur in the relationship between my different roles (researcher and scaffolder) in my interaction with the teachers. In an action research approach I need to balance these two roles and be aware of them in my interaction with the teachers.

There was interaction between the teachers, and myself as researcher in the scaffolding process, but also interaction between the teacher and the students, where the learning activities were taking place, and both processes can be seen as processes that are defined as scaffolded. The collaborative interactions between the teachers and myself as researcher and 'scaffolder' (facilitator) are the foundation for

the scaffolding in the teaching practice. I also observed the online activities and the teaching, and scaffolded the process during their teaching. The teachers' activities in the teaching were intended to scaffold the students learning process. At the end of the learning process I left the teachers with their new knowledge and experience to bring the activity further. Illustrating the learning process according to scaffolding could be such as this seen from my role as a researcher (see Figure 10):
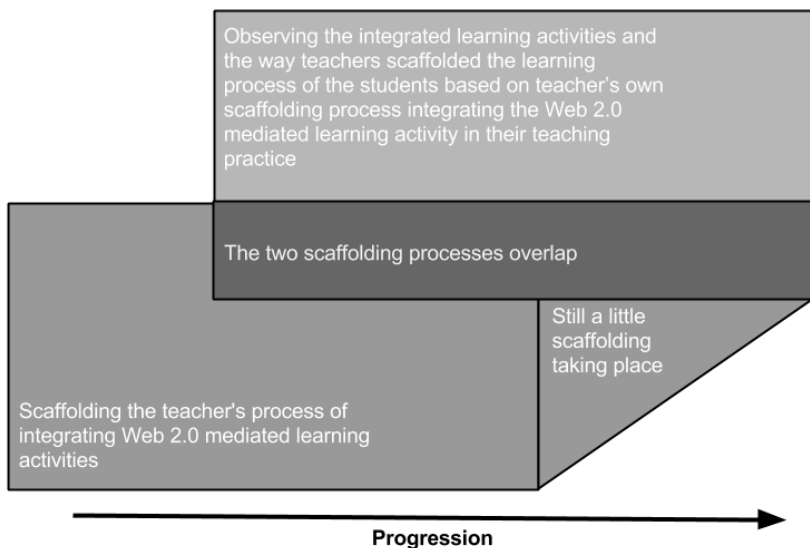
Figure 10: The scaffolding setup

The figure can even be adapted to include the same decreased process when a semester is ending and the teachers let the students continue their study-programmes built on the learning and knowledges gained.

During the progress of scaffolding and collaborating with the teachers I collected different kinds of qualitative data, which I will present in the next section.

4.3. HOW DID I APPROACH MY DATA?

In all three cases I followed up on the iterations by conducting interviews with the teachers. The focal point in the interviews concerned how the teacher experienced the activity, what they believed the students gained from the activity, where in the area of PBL they felt the activity would be placed, how the outcome of the activity related to the teacher's expectations, and finally three positive and three problematic issues in integrating the Web 2.0-mediated activities (see Appendix D for the interview guidelines).

My empirical data is therefore based on different kinds of data, which to some extent even differ from each other in the three cases. I have tried to illustrate this in the table below (Table 2):

Table 2: The kind of data gathered from the cases

Cases	Data material
Case 1 (Iteration 1)	• Notes from planning meeting with teacher • Observations from lectures • Informal dialogue with teacher after lectures • Interview with teacher • Follow-up and collection of material from the online part of the activity
Case 2 (Iteration 1)	• Notes from planning meeting with teacher • Participation in the first and last lecture • Survey of students • Interview with teacher • Follow-up and collection of material from the online part of the activity
Case 2 (Iteration 2)	• Notes from planning meeting with teacher • Observations from lectures • Informal dialogue with teacher after lectures • Survey of students • Interview with teacher • Follow-up and collection of material from the online part of the activity
Case 3 (Iteration 1)*	• Interview with teacher *I did not take part as researcher, and my data from this is dependent on the interview with the teacher.*
Case 3 (Iteration 2)	• Notes from planning meeting with teacher • Observations from lectures • Informal dialogue with teacher after lectures • Survey of students • Interview with teacher

	• Follow-up and collection of material from the online part of the activity

When I presented my cases I also touched upon the results of the surveys I carried out with the students. The intention of the surveys was to get an idea of what the students participating in the activity initiated by their teacher were experiencing, and furthermore what the students gained from it. Together with the notes and observations taken following the interactions and activities that unfolded in the online environments, I used this in my interviews and planning meetings with the teachers as issues for dialogue and further iterations, but also as a background data source for going more deeply into the data collected from the interviews. The interviews helped me answer my research questions, as it was the teachers who were responsible for evaluating the student's learning outcomes, which means they need to consider the learning potential in the activities they initiated as part of their learning design. It had thus been important to me to gain an idea of how the teachers experienced the activity they started. The interviews combined with the notes from planning meetings, observations during the lectures and data from the online environments enabled me to write some of the articles I will present.

My approach to the data analysis was based on a qualitative approach, which my data material (Table 2) also illustrates. Taking a qualitative perspective gives me the opportunity to approach my data inductively, where categories of importance, patterns, and relationships are identified through an iterative and reflective discovery process working with the material as the data collection process begins (Schutt, 2012).

There are different techniques when working with qualitative data analysis, which Schutt (2012) outlined:

1. *Documentation of the data and the process of data collection*

2. *Organisation / categorisation of the data into concepts*

3. *Connection of the data to show how one concept may influence another*

4. *Corroboration /legitimisation, by evaluating alternative explanations, disconfirming evidence and searching for negative cases*

5. *Representing the account (reporting the findings)*

(Schutt, 2012, p. 325)

The analysis of data and notes begins with the observations and dialogue with the participants, and the researcher starts identifying issues or concepts that appear. Notes, transcripts, and documentation in general, are important in the data collecting and analysing process.

I used Transana[15] to transcribe my interviews with the teachers and code the data for further analysis. I initiated my data analysis by posting notes during the dialogues with the teachers, during the online activities and lectures I observed and in the interviews with the teachers. Accordingly I found that I needed some way of structuring my progress, and I found that the principles of the "*open coding*" process within a grounded theoretical approach (Glaser & Strauss, 1967) were one way of help me do so. Grounded theory is a qualitative research methodology based on simple but systematic analytic techniques, placed within a working process with a combination of induction and deduction named *analytic induction* (Boolsen, 2010; Strauss, 1990; Strauss & Corbin, 1997).

As researcher, the analytic process is based on the questions or hypothesis that need to be investigated combined with the observations done, and the process can evolve over time based on the results found during the analysis. Using a grounded theoretical approach for analysis provides the opportunity to go in many directions in a structured way, and the process can change en route. Action research and grounded theory can not be completely integrated, but using techniques can add rigour to the process of analysis within the action research framework (Baskerville & Pries-Heje, 1999). Grounded theory is based on developing theory from the results in the analysis, but I do not believe I am developing a new theory in this dissertation. I have chosen this approach because it represents different strategical methodologies for handling data material and following a progression in handling the data and outcomes. The grounded theory approach develops general concepts among which relationships can be identified. From the grounded theoretical approach, as did Baskerville and Pries-Heje (1999), I extracted the process of open coding from in regard to my data and analysis, and working with matrix thinking for making cross-disciplinary references and results. The use of open coding is to reveal essential ideas found in the data based on two tasks. One is labelling phenomena based on, for example, observations and other data, and the other is discovering categories according to various dimensions (Baskerville & Pries-Heje, 1999).

With my research questions in mind, my analysis was initiated using an open coding approach. It was based on the observations made and the notes taken during the online activities and the lectures in which I participated. It was also based on the process of transcription, where I, as part of this process, identified some of the specific categories (Strauss & Corbin, 1997; Boolsen, 2010). Via the open coding process I identified different keywords, which had basically evolved from what I

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[15] A software tool for analysing qualitative video and audio data – http://transana.org

had observed in the online activities and the lectures, combined with my notes from the discussions with the teachers and the purpose of my research. I had tried to build these into the interview guide used for interviewing the teachers, and as part of the transcription process I used the keywords to structure my data and get an overview of it according to the purpose of my research and my research questions.

Based on the keywords, rereading and reviewing the transcripts, the conditions for my data, and having my research questions in mind, I defined five main categories of concern: *learning potential* – I wanted to look for instances on this in the interview according to my research questions, *pedagogical* – to identify whether the teachers identified their pedagogical approach as PBL, and to identify the pedagogical approach the teachers were using, *teacher* – aspects of the teacher role when designing for learning and furthermore taking part in the interactions and the activities, *students* – aspects within the role as students in general, but also when interacting and participating in the activities from the teachers perspectives and *technology* – to identify the teacher's issues and views according to this. The keywords were divided into groups in the five categories, and the audio clips were organised by these keywords and the five categories, as illustrated in Table 3.

Table 3: Categories and keywords found from the data analysis

Categories	Keywords
Learning potential	Learning potential Possibilities
Pedagogical	Learning approaches PBL Pedagogy
Teacher	Facilitation of teachers Gained as teacher Barriers – teacher Challenges Limitations Barriers – technical Expectations – teacher Change perspectives – teacher
Students	Facilitation of students Gained as students Behaviour – students Competences – students Lack of competences – students Study techniques

Technology	Technological approach
	Technology – limitations
	Technological possibilities
	Web 2.0-mediated activity

Based on these first findings of keywords and categories in the data analysis I started to look at some of the remarks from the teachers and used this for writing Article III, *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"*, in collaboration with Nina B. Dohn, which will be presented in the next chapter together with the other two research articles chosen as part of my dissertation.

I used the first findings and the categories in the further analysis, which is presented in Chapter 6 in the initial process of making a cross-analysis within the keywords, which I formatted into a matrix based on my categories and the keywords, helping me to further structure my analysis.

CHAPTER 5.

5.1. SUMMARY AND REFLECTION ON MY RESEARCH ARTICLES

In this chapter of the dissertation I would like to summarise, reflect and comment on my research articles, which are represented in Part II. I will clarify how the articles in different ways apply to my research questions, although I will also note that my data contains information that is not included in any of my articles, but can still help to answer my research questions.

5.1.1. ARTICLE I *"FROM WEBSITE TO MOODLE IN A BLENDED LEARNING CONTEXT"*

This article has been accepted for publication in The International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), and since I handed it in for final submission I have added minor clarifications in the article, so that the article in Part II will not be exactly identical with the one publicised.

In this article I dealt with how to design and accomplish an implementation process for implementing a VLE at the Faculty of Social Science, taking into account the pedagogical approach at AAU, and providing a better opportunity for collaboration and sharing both between teachers and students but also among students in general.

This article describes the considerations and the process for implementing Moodle as the VLE, which was based on an action research approach built on dialogue with different kinds of participants, and actions taken in designing, and followed up by reflections and adjustments in dialogue with the participants. I see this article in many ways as the point of departure that triggered me to undertake a PhD, as during this work I became aware of the increasing need to scaffold teachers both in a pedagogical and technological context when implementing learning platforms and designing learning activities.

From the implementation project described in this article there is an expectation that when blended learning is supported by the use of a VLE there emerges an opportunity to underpin collaboration and sharing of knowledge among students and between students and teachers. Including the use of VLC for collaboration and support seemed ideal, and we tried to point to features in the VLE that underpinned different kinds of collaboration in the first iteration of the implementation process. Collaboration could be seen at many levels, and both in the project phase and the courses, but it will not happen within courses through the system itself, it will need

to be an activity that teachers integrate into their practice, and it seemed difficult for the teachers to accommodate this in the first place.

Many user groups were involved in this project in order for the IT to be successfully implemented. Building on an action research approach it was important to interact with the user groups to create a common understanding, but also to establish ownership of the development and implementation. We sent questionnaires to the user groups to make an evaluation of the changes carried out during the project. The project came as a natural follow-up to the movement towards a combination of the pedagogical model at AAU and e-learning and the strategic focus related to this, which was reported by Gylstorff et al. (2009). Based on their report, six possibilities were listed as important for e-learning environments: 1) informative possibilities, 2) communicative possibilities, 3) possibilities for file sharing, 4) collaborative tools, 5) process-supportive systems, and 6) academic supportive learning objects. In the article I also draw upon this perspective when designing for learning in a blended learning context from an AAU pedagogical perspective.

The article explores how the implementation was conducted and the decisions that were made during the process. As part of the process there was an evaluation with the aim of making corrections in future versions, which is also presented. All of this leads to the concluding part, which enhances the awareness of scaffolding teachers in their design for learning using new technology, but also inspires them with a pedagogical perspective on the use of ICT tools. The article also indicates the importance of not designing the VLE to contain everything, but to be aware of the limitations of the platform, and relate to this in the development.

5.1.2. ARTICLE II *"SCAFFOLDING TEACHERS INTEGRATE SOCIAL MEDIA INTO A PROBLEM-BASED LEARNING APPROACH?"*

I presented my PhD research based on this article in 2011 at the Sixth International Conference on e-Learning (ICEL) at the University of British Columbia, Okanagan, Kelowna in British Columbia, Canada, where I won the prize for best PhD paper and presentation, which gave me the opportunity to get my article published in the *Electronic Journal of e-Learning* (EJEL), March 2012, Volume 10, Issue 1. I furthermore participated in the Eighth International Conference on e-Learning at the Cape Peninsula University of Technology in Cape Town, South Africa, in 2013, where I also won the prize for best PhD paper and presentation.

One of the objectives of this article was to promote ways to scaffold teachers when they design for learning to use Web 2.0-mediated technology. In this article I describe my preliminary observations and the data gathered in the three different cases.

In this article I start by defining Web 2.0 and the PBL approach to learning in order to identify the crossover between these two aspects. Much of this is based on the research in connection with the EATrain2 project and the literature reviews conducted as part of my research. Taking into account the description of Web 2.0 and the shift in focus, I touch upon the transition from Web 1.0 to Web 2.0, building on Conole (2007) and her view of this change. She talks about three shifts in focus
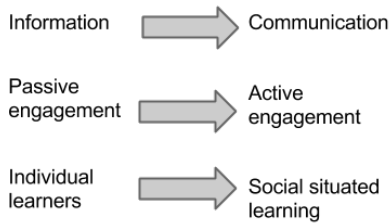
(Conole, 2007, p. 82):

Figure 11: The shift in focus from Web 1.0 to Web 2.0.

This shift in focus explaining why Web 2.0 fits very well with the PBL approach. PBL in "the Aalborg model" builds its course design on active learners, group work, and interactions between students and teacher. I suggest that PBL is a very learner-active and collaborative pedagogy (Kolmos, Du, Holgaard & Jensen, 2008; Kolmos et al., 2004; Ryberg et al., 2006).

An important recommendation in this article is that *when looking at Web 2.0 from a broad perspective, Web 2.0 should not only be seen as a technology or a resource but also as an activity* – for example, using a blog (technology) for blogging or reflection (activity). As Dohn (2009) also stresses in her notions of combining Web 2.0 and learning, and from the conclusions in the EATrain2 project, I find it important to:

> *"Emphasize that employing a Web 2.0 technology does not necessarily entail pedagogically innovative Web 2.0 practices. […] Therefore, Web 2.0 learning is not only about using particular technologies, but equally about the degree to which teachers adopt more student-centred, participatory or collaborative practices."*
>
> *(Buus, 2012, p. 16; Tambouris et al., 2010, p. 13)*

The article also briefly touches upon the tensions between educational practice and the ideology of Web 2.0 practices, which need to be considered when dealing with Web 2.0. I have also touched upon these tensions in the introduction Part I.

Having identified the crossovers between PBL and Web 2.0, I use the article to present the CoED method as my approach to initiating the collaboration with teachers, who will be the main focus of my research. Working with the CoED method in different projects has brought some challenges (Buus, 2011; Ryberg et al., 2015). These challenges are presented in the article as a foundation for considering the methodological design I create in my research. I have chosen to extend the CoED method and in this article I present the intended methodological approach (see Chapter 3 for an illustration). In Article III I will present the changes made during my empirical research.

This article ends with some preliminary reflections on the first analysis, based on informal interviews, dialogue with the teachers and observations of the interactions going on, when collecting my empirical data. The reflections mainly concern 1) *awareness* – making teachers aware of the possibilities of underpinning Web 2.0-mediated learning with Web 2.0-based technologies, 2) *the importance of scaffolding teachers* – a) *pedagogically* in learning design and development, and b) *the use of technology* – implementation: bringing the design from idea to practice.

5.1.3. ARTICLE III *"TEACHING PBL WITH WEB 2.0 – A CASE STUDY OF POSSIBILITIES AND CONFLICTS"*

This article is based on a collaboration with Nina Bonderup Dohn, at the University of Southern Denmark (SDU), as a joint venture in the network for "teaching problem-based learning in virtual environments" (ScandLE) (Lab, 2010). The ScandLE network was established with funding from the Nordforsk foundation in November 2010 and had an expected duration of two years. The outcome of the network was the book *Problem-based Learning for the 21st Century* (Christiansen, Kuure, Mørch & Lindström, 2013), and this article presents a chapter of this book under the theme "*case studies in teaching*".

In this book chapter we ask about the success factors and challenges in integrating Web 2.0 activities when developing these activities to support PBL. We start by describing pedagogical design issues and then presenting the changed methodology and design of the study in order to reach the findings.

The book chapter is based on the empirical research done during my PhD and contributes to discussion about some of the design issues when designing PBL-based activities underpinned with Web 2.0-mediated learning (Dohn & Buus, 2013, pp. 238–239):

- The role of Web 2.0-based activities in a PBL framework.
- The role of the teacher in Web 2.0-mediated PBL activities.
- The action to be taken on Web 2.0-based communication in a PBL framework, and the responses of the teacher in this setting.

- Development of teacher competences to support the design of Web 2.0-mediated PBL activities.

We briefly explain the process of the methodology in my research, which has changed from the intentions presented in Article II *"Scaffolding Teachers Integrate Social Media Into a Problem-Based Learning Approach"*. From a looser process with opportunities for small group sessions presenting Web 2.0 technologies, it became more specific regarding the interaction between the individual teachers and myself, and how I intended to obtain the data collected. The change made in my methodological approach follows the action research approach more closely as a joint event between teacher and researcher than was first intended (see Chapter 3 for an illustration).

In this article is a more detailed presentation of my case studies. During the work for this book chapter we reduced the cases from four to only three. This was because one of my cases (Case 3 presented in Chapter 4) did not deal with PBL as understood by Dohn and Buus, and when we looked more deeply into this, we found that it dealt more with an active learning approach.

The article elaborates some of the findings in the cases based on the follow-up interviews with the teachers reflecting on what they considered the pros and cons in their integration of Web 2.0-mediated activities in their teaching practice.

We conclude by discussing the findings in relation to the two questions we saw as our research approach in this article (Dohn & Buus, 2013, p. 248):

1) Were the cases successful in developing viable ways of making use of Web 2.0-mediated activities in support of a PBL approach?

2) How can we explain the difficulties that the teachers experienced in establishing an adequate learning dialogue within the Web 2.0-mediated activities?

It can be seen from the results, that the activities made space for knowledge sharing, collaboration and sharing of information, but also highlighted the role of the teacher in the interactions. It is an important challenge for the teacher to be really explicit about their expectations from the students and how they can further facilitate their collaboration and participation in classes and online. The study also indicates that it is particularly technical issues that may be a barrier to developing teacher skills and competences in the design of Web 2.0-mediated learning, but this can be overcome by scaffolding teachers and enabling collaboration between teachers and a technical-pedagogical facilitator. This kind of collaboration can further empower teacher integration of Web 2.0-mediated learning.

The study also shows some instances that indicate tensions related to teacher understanding of adequate learning dialogues and the facilitation of this kind of dialogue. These instances are underpinned by earlier work done by Dohn (2009) and Dohn and Johnsen (2009), who claim that:

> *"...utilizing Web 2.0 activities for educational purposes leads to a) inherent theoretical tensions in implicit views of knowledge and learning and b) practical challenges regarding a number of pedagogical issues, including collaboration, evaluation, and the general aim and status of the material produced by students".*
>
> *(Dohn & Buus, 2013, p. 250)*

This claim and the results of the study are discussed from a theoretical perspective building on Bourdieu (1977, 1990, 2000) and the non-explicated sense of "right" and "wrong" behaviour built into our habitus.

The study further points to identified key questions that are important to consider in future research so as to raise awareness in designing for teaching with Web 2.0. It is important to empower teachers to deal with tensions and challenges in their learning design for Web 2.0-mediated learning (Dohn & Buus, 2013, p. 254). The book chapter ends by concluding that the research delivers proof that Web 2.0 activities have a constructive and productive potential for learning from a PBL perspective.

5.2. THE CONTRIBUTIONS I MAKE WITH THESE ARTICLES

The three articles I have chosen as Part II of my dissertation were selected because in different ways they mark the line and progression of my research, and partly answer my research questions.

Through the articles I have shown the need to scaffold teachers when they integrate new technologies. My article *"From website to Moodle in a blended learning context"* was the springboard for this identified need to scaffold teachers, and the article also made it clear what puzzled me about how PBL at AAU could actually be seen in course activities.

I managed to develop a concept for scaffolding teachers in their design of learning by using an additional version of CoED, by participating in different projects and with inspiration from my colleagues at e-Learning Lab. I had to elaborate on this methodology during the process and make it more teacher-individual than first intended, but this can be seen as a natural progress due to the number of participants, and seen from another perspective it can be hard to make teachers use, for example, learning objects, without redesigning them for special use in the learning process, which I think was also my general experience in the initial workshop. I still claim that my research substantiates the need to scaffold teachers in

different ways when they use new kinds of Web 2.0 technologies or ICT tools in their design for learning.

With the last article I contribute by showing the possibilities and challenges teachers identify and face in integrating Web 2.0 in their teaching practice. This is based on what I found in the preliminary analysis of my interviews. Some of the main issues concern the way in which teachers help their students collaborate and share knowledge. The article raises technology as a barrier, and it emphasises that it is important to scaffold teachers when they integrate new technologies; for example, having a person with both pedagogical and technological understanding has been advantageous. The article takes this further by explaining in which way the activities in the different cases were successful in using Web 2.0 in a PBL approach, but also stresses that there are some challenges that need to be faced and maybe even questioned during the learning design.

Even though, via the three articles, I have almost answered my research questions, I went through my data to look for additional findings that give even more concrete reflections on my research questions. I could have written another article with further reflections on my data and my research questions, but instead I undertook this reflection in the next chapter of this dissertation. I do intend to base the article(s) on the next chapter after having submitted my dissertation.

CHAPTER 6.

In this chapter I will extend my preliminary analysis to see whether, from my data, I gain new insights not described in my articles and can be more concrete in answering my research questions. Although Article III, *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"*, with Nina B. Dohn, offers a preview of answering my research questions, the material was not complete, as I was still gathering data from the second iteration in Case 2, when writing Article III. The outcomes from Case 2 were not represented and, in addition, Case 3 is not discussed in detail in any of my articles.

As my focus is on the teachers I decided to extend my preliminary analysis and take a closer look at the details of the teacher's experiences. Based on the categories and my research questions I look into what was directly expressed in the interviews in order to interpret teacher statements and get a better understanding of what actually is in play in the activities initiated. Hopefully combined with my findings in the research articles, this will lead to my research questions being answered.

6.1. WHAT DID I DERIVE FROM MY DATA ANALYSIS?

To explore my data more deeply I intend to look at what was said individually and similarly during the interviews within the central categories, whilst keeping two of my research questions in mind, namely:

- *"What is the learning potential of integrating Web 2.0-mediated learning in a PBL approach?"* and
- *"What are the kinds of challenges teachers experience when integrating Web 2.0-mediated PBL-based activities into their practice?"*

In Chapter 4 I gave an overview of the different kinds of data gathered. The interviews in particular gave me good insight into the intentions and experiences of the teacher, which proved the most useful approach to answering my research questions. I have of course combined this with my knowledge about the interactions that have taken place in the online environments and the answers from students based on the questionnaires, which I briefly touched upon in Chapter 4.

I would like to stress that my primary focus on data in the analysis has been the interviews with the teachers. It is important to focus on the teachers, because they are professionally qualified within their domain, and they are the ones who have to evaluate student learning through exams. It is teachers who design and set the framework for the learning process students must be led through via literature, activities, collaboration, etc., and thus it will also be through the activity initiated by

the teacher that creates a certain kind of learning framework within their domain. This is my reason for primarily focusing on the data in the teacher interviews, because the teachers play an important role in student learning process in correlation with the way teachers manage the integration of Web 2.0 in their teaching practice.

In my extended analysis I undertook cross-searches of my data, and identified different themes throughout the categories. My first search was mainly related to my research question about learning potential and PBL and was therefore based on the central keywords: 'learning potential', 'possibilities', 'gained as a teacher' and 'PBL'. Again I would such as to stress that this search was based on my perspective of teacher obligations to ensure student learning, and therefore I think it makes sense to look into the teacher statements about their learning goals, intentions and experiences in this regard. In my second search I focused on the challenges and barriers experienced, and also highlighted, by the teachers.

Specific searches provided results, which I tried to organise into some thematic issues. I initially organised them within the categories I already had, but after doing this I started looking across the categories and the thematic issues, still keeping my research questions in mind, and identified the following interesting themes, which I will reflect and elaborate on based on the teachers' ideas, intentions and experiences, and relate to my preliminary findings in my articles.

6.1.1. LOOKING FOR THE LEARNING POTENTIAL

As also noted in Article III (Dohn & Buus, 2013), the main intention within all three cases was to help the students share knowledge and collaborate whilst becoming aware of the benefits they gain by doing so. My analysis shows that ***student skills and competences*** is also a theme that is highlighted by the teachers, as the different activities provide opportunities to train and develop student skills and competences in different ways, supported by sharing and collaborative skills. Some of the experiences the teachers mention are:

- Use of the blog functionality to give students communication and writing skills, which is important in real-life situations for the professions of the professional bachelor's degree. The teacher also mentions the possibility of using video (mobile phones) for documentation, and reflection media to learn the skills of communication and dialogue with clients.
- Opportunity to develop different skills within study techniques using new technology, as students were introduced to an open source reference tool (Zotero) and a social bookmarking tool (Diigo).
- Developing skills on collaboration from a global perspective and interacting in a digital world. One of the teachers stated that *"students have a shortcoming in the network thinking mentality [...] students often think more 'short term' such as 'what to do now*?" (Teacher R – author's

translation). Students need to learn to collaborate and see each other as colleagues rather than competitors, and gain an understanding of the importance of networks, as some students will not share their knowledge.

- Preparing students for practical circumstances and furthermore confronting them with real-world problems, but giving them the opportunity to deal with these and solve the real-world problems in a safe environment.

As one of the teachers also noted, *"We need to educate students to interact in an international setting"* (Teacher R – author's translation), and for this he suggested making a digital vocational competence profile in the study profile, for example social media competences, and furthermore giving students some digital foundation, digital norms and knowledge about the digital world to prepare them for the international digital settings. On the other hand is it also important to make the students aware of the academic world and the norms in the educational settings compared to the Web 2.0 ideal world. There are some tensions that challenge students such as plagiarism, with access to all the information via tools like Google Scholar, online open journals, or the internet in general. The development of students in being critical and their awareness of references, literature and "patchworking" materials as seen in a Web 2.0 context also needs to be a point of awareness in the activities initiated. So there is potential, but also potential issues to take into account.

Actively participate in and reflect on one's own learning was another important theme raised in the interviews. The activities were organised in different ways to encourage the students to be more active and collaborative. This was important to one of the teachers whose intention was to make the students more active and actively participate in order to improve their learning, and furthermore motivate students to collaborate more from a global perspective. As one of the teachers stated, *"Students have been engaged. Collaboration, active participation and discussions have been taking place. […] Students have actively contributed and been motivated to participate – voluntarily"* (Teacher L – author's translation). Another teacher said that she also intended the activity to make students more active in their participation and to see how they collaborate and interact with each other.

Initiating Web 2.0-mediated activities can help students actively reflect on their learning, and give them new routines for reflection. It is important to encourage students to reflect and not just sit and take notes, but also to stimulate students to think critically. As also mentioned by teacher R, it is important as a teacher to engage students in critical thinking, crowdsourcing, peer review and so on, to improve their learning results. On the other hand, as also noted by Dohn and Buus (2013) in Article III, the students in the first iteration of one of the cases barely used the opportunity to post methodological or theoretical questions, or to be reflective or critical in their approach to learning. In the second iteration the participative level was increased, but could still improve. Here the role of the teacher is very important,

as they need to scaffold the students' collaboration and interaction even more. There is potential for the activity to be distributive rather than collaborative and active, and the intended learning process from the teachers' perspective to be lost. As another teacher pointed out: *"If students do not participate actively in the activity then it is not worth using time on it"* (Teacher L – author's translation). This statement reflects the responsibility teachers have in bringing active learning to their teaching and in being responsible for the support and evaluation of student learning progress by designing learning activities for active and participating learning in an AAU context. It reflects teacher engagement in activities and student expectations, which need to be aligned with the teacher's intentions. Teachers need to be explicit about their expectations and follow up by scaffolding the student regarding changes in the design for learning and the student's expectations which can be different, according, for example, to educational background and nationality, etc.

Another theme identified concerns the question ***PBL or not?*** Asking the teacher about their views of PBL and the activity they have initiated produced statements along the line of making case-based PBL in different ways. One of the courses used cases related to theoretical issues, and tried to give relevance to real-world issues. Another course built on a mini project in a framed set-up (teacher-centred), and as the teacher said, *"it is another pedagogical angle to the project-based project work"* (Teacher R – author's translation).

Two of the teachers intended to help the students be more active in the line of PBL integrating Web 2.0 technologies, and as one of the teachers said, *"if we are able to challenge the group dynamics in PBL work to also enhance classes, and the students in a year group for collaboration, then PBL is given another 'push' forward. […] Looking at the PBL definition the activity does not make it more PBL, but it gives me an opportunity to be closer to the students in their group work and underpin the group work by making it possible for students to collaborate"* (Teacher R – author's translation).

One of the teachers very specifically described how he saw PBL as part of the course underpinned by the integrated Web 2.0 technology, because the students dealt with real-world problems, and furthermore it gave students the potential to have more influence in in the future of the collaborating company. The teacher was trying to think about education and learning as vocational behaviour, and in the second iteration he invited the company and other teachers to participate in the Facebook group for supervision, which gave another dimension to the course. During the interview he suggested ideas for elaborating on the activity by inviting the company to evaluate the three best projects and combine this with a session where they were invited to speak about what they might explain to students that the company has gained knowledge-wise from the project.

PBL, in the understanding represented by the teachers, can be seen in the intersection between active learning and PBL within the model that I presented in Chapter 2, Figure 2, where the *problem* is teacher controlled, the *work-process* is both participant controlled and teacher controlled and the *solution* is more participant controlled. Even this PBL organisation it can be seen in relation to the three characteristics of PBL that Savery (2006) notes and that I presented in Chapter 1 (p. 18) in the combination of PBL and Web 2.0 regarding the tensions of educational settings vs. Web 2.0 ideological perspectives.

Another issue that I found further elaborated in the data could be called **documentation**. As one of the teachers noted, *"this is one of the things young people nowadays do a lot – documenting stuff – but it's a good way to maintain knowledge"* (Teacher G – author's translation). The teacher suggested that it might be an idea to give students space for a shared repository for them to use for documentation and exam preparation. The students even asked for extended time to update the final blog activity, which gave them the chance to build a shared repository. The students were, for example, using the blog as a way to maintain notes and thus share knowledge, but a teacher commented that not all students, on the other hand, seemed to be as familiar with shared notes as with notes written by themselves, and especially if the students had not participated in the lecture and in the dialogue and writing in the blog. Another teacher noted that the use of the Facebook group illustrated a need for some kind of forum for dialogue and sharing among students and between students and teachers, and she saw that the Facebook group was used for both practical information and also from a learning perspective. The study notes the students made during the course were also rated among the students using the Facebook group, and this was also used as a kind of documentation for the content of the readings and lectures.

Documentation could also be seen in the light of tensions regarding evaluation, which is noted in Article III (Dohn & Buus, 2013). Teachers need to be aware of the tension in the logic of the educational setting vs. the logic of Web 2.0. The educational setting posits, for example, student input to blogs as documentation of the degree to which the students have acquired some knowledge or an understanding, which is in contrast to the logic of Web 2.0, where student input is posited, not as documentation, but as participation in the ongoing process of knowledge creation. This needs some consideration when taking evaluation and assessment into account, as the teacher has the authority to endorse or reject student inputs. Endorsement consists of the use of blog postings by the involved participants (not just the teacher).

Based on this tension Dohn and Buus (2013) note:

> *"It should be pointed out that if she in future iterations succeeds in finding an evaluation format that fits the Web 2.0 ideals (e.g., by*

involving fellow students more in the endorsement/rejection of input),
she has to carefully think through the alignment between this evaluation
format and the learning objectives and learning activities of the course.
Otherwise the risk is great that she – and the students – will feel that her
teaching is out of balance and the evaluation format of the blog activity
misaligned with the learning objectives of the course and with the final
course exam.

(Dohn & Buus, 2013, p. 252)

Documentation could also be seen from the perspective of the teachers, and not only as students creating documentation: as one teacher noted the opportunity to video-record the exam presentations, which would benefit the company collaboration for future learning purposes among students attending the course. Along the lines of video recoding, another teacher noted the possibility of encouraging students to use mobile video recording to practise, reflect on and document practical and vocational dialogue with "clients" in a role-play set-up. In both situations it would be necessary to note the tension or potential issue described earlier.

Finally, there were short statements about an extended ability to deal with ***online teacher collaboration***, as two of the teachers experienced and saw a huge potential in the possibility of colleagues also participating in the dialogue in the Facebook group. Using the Web 2.0 technologies makes it easier to include online teacher collaboration. One of the teachers also argued that he found it seemed to create a good balance in the progress of the students' learning to combine the different course scaffolding activities in the mini project, and invite the other teachers into the Facebook group for discussions with the students and be an online presence. The teacher found that inviting the other teachers to participate in the Facebook group strengthened the engagement of the students and gave the teachers a chance to supplement each other. In line with this, the teacher stated, *"using a Facebook group emerged on the students' own initiative and inviting other teachers and the collaborative company 'inside' also gives access to the social sphere of the students, which could be an ethical issue"* (Teacher R – author's translation). I will only make a brief comment on this ethical issue, which I discussed with the teacher in one of our sessions, and it may need to be addressed in future article.

In our discussion we talked about the way in which we ethically relate to using Facebook, for example, from an organisational perspective, which can have an effect at both a personal and organisational level on both teachers and students, and especially if the organisation uses Facebook more formally. For instance the use of private profiles vs. professional profiles in educational settings could be a concern, such as a teacher or student uses ones private profile in educational settings and mixing the two domains (private and professional). What are the ethical issues of a teacher using their private profile to 'friend' students and participate in Facebook groups? Is there a need for organisational regulations that teachers have a

professional profile that is used in educational relationships? What are the potential issues if the teacher leaves the organisation or institution in disagreement with the management, but still have personal relationships with large groups of students? There could be ethical issues resulting in conflict between the organisation and a teacher who has been putting their material on a Web 2.0 technological platform not related to the organisation's hosted learning platforms or technologies. This is a broad discussion, which I find both interesting and relevant, but which I will leave here for now.

6.1.2. CHALLENGES AND THE NEED FOR TEACHER AWARENESS

I identified different learning potential and approaches to learning based on the teacher intentions, experiences and statements about Web 2.0 integration. A theme emerging in my analysis, although it does not deal as such with the question of learning potential but more what is important for handling the learning potential, referring to teacher awareness and challenges, is what I have called ***framing***. One of the teachers noted that it is important to frame the activity in a way that helps students engage in reflection, but also to balances expectations, and two of the teachers agreed on the importance of making intentions and expectations very clear to the students, to help them participate actively in the activities, but also to ensure the students gain the learning potential intended. One of the teachers said, *"It is important to meet expectations to prevent students from expecting things differently than the teacher intends or has planned"* (Teacher R – author's translation). As teacher it would be a good idea to give the students more responsibility for their own learning, and adopt a role as facilitator rather than teacher sometimes. As one of the teachers noted, it is important as a teacher *"to be able to guide students and make them more responsible for their own learning"* (Teacher G – author's translation).

This is very much in line with PBL and the role of teachers as facilitator or scaffolder in relation to students (learner). A point to consider is Daniels (2007) question of whether scaffolding can only be produced by 'an expert' or whether it can be negotiated (Daniels, 2007, p. 318). The scaffolding that takes place in the case studies is build on a combination of these two perspectives, aligned by Daniels (2007).

Another issue concerning framing is the need the teacher to engage and motivate the students to be active. One of the teachers noted that the active participation of teachers offers more potential for learning. On the other hand, time becomes an important factor, as time and energy are required to succeed in the integration of activities. Ertmer and Simons (2005) also stress that time is an issue that must be considered when integrating PBL in learning, as it takes time to integrate and adjust activities according to learning objectives and the intentions of the teacher. Time is often noted as a factor in other articles on the integration of ICT in general (Khalid

& Buus, submitted; Schroeder et al., 2010). The teacher needs to invest time in integrating the technology or else there will be a lack of balance regarding learning objectives and learning activities, as noted before.

Another perspective of time was noted by one of the teachers, who said that in the activity he seemed to save time, but there was less activity from the students than he intended, and that he therefore noted that he might not save time if the activity needs to have more substantial content. I have placed this under the theme of framing as this is based on the responsibility of the teachers to support the learning progress of the students, and therefore the teacher sets the frame. In both Article II (Buus, 2012) and Article III (Dohn & Buus, 2013), time as a factor is noted and reflected upon. Time is considered in the sense of taking the time to adopt technology from the teacher's perspective, but the authors also touch upon the fact that the students do not always adopt new technologies when they are presented as "nice technology for your study" if they are not required to do so, even when there are clear advantages.

I have named another of the challenges that requires focus ***communication***. Communication relates to both the written and spoken dialogue that goes on in the courses, and as a teacher there is a need to be aware of the different communication paths. As one of the teachers notes, *"the written word has a great impact as it remain visual in the Facebook group. The spoken word will be referred to and then 'die'."* (Teacher R – author's translation). Another teacher supplements this by saying: *"It can be a challenge to work in the written forum instead of the spoken space"* […] *"written things in 'a blog' or in general seem stronger and remain visible in the forum, which has a stronger impact than spoken or oral presentations"* (Teacher G – author's translation). This kind of communication needs training, states one of the teachers, as *"you write to many and not just for a group as such, but also for people lurking. [....] You write to the 'public space'"* (Teacher G – author's translation). On the other hand, there are also pitfalls in one of the activities in the way it is underpinned and the communication is taking place, as *"students might not get that same quality of supervision as in a face-to-face session. The written forum does not at the same level give the opportunity to change track on subjects or be immediately inspired by new ideas as when talking together face-to-face"* (Teacher R – author's translation).

The theme of communication can also be seen from another angle, as Teacher G noted: *"It can be a challenge to respond to all the written material the students might produce in the blog. [And] how do you catch the things that are wrong?"* (Teacher G – author's translation). Again the teacher's reflection relates to their awareness of the communication path as "one-to-many", which is the communication style in a blog. Based on the amount of postings in the blog the teacher also concluded that she saw a challenge in the evaluation of the postings, as also noted in Article III, *"Teaching PBL with Web 2.0 – a case study of possibilities and conflicts"* (Dohn & Buus, 2013). It is not possible to present everything in a

blog during lectures, so Teacher G felt that there is a need to keep the oral element of lectures. The issue of evaluation has been noted before, and also as one of the tensions presented in Chapter 2, where Dohn stressed that evaluating the work of students can be problematic and a tension in the educational vs. Web 2.0 ideology. From a learning perspective evaluation needs to show evidence of knowledge, competences within the domain and the quality of the content presented. There is also the question of "who" is to do the evaluation, which gives different views of the role of the teacher in these matters, as they will have a pedagogical responsibility towards the student's learning. In regard to a Web 2.0 approach, participation could be a criterion for evaluation, but this could cause issues regarding the learning approach about what will be defined as participation in respect of qualitative participation. I suggest that there could be another way to proceed with the blog posts, for example by making the students do a final summary of the theoretical elements learned, but the teacher needs to be ready to carry out this step in their teaching as well, and to evaluate that part, but still allow the contributions to the blog to be integrated in the evaluation. Which leads back to the 'framing' issue.

In addition to the communication challenges, the teachers also noted more **technical challenges**. For instance, one of the teachers noted that she *"was challenged by the technology in the sense that they were experimenting with more than one kind of technology, and therefore it was not ready from the beginning of the semester. This made it hard for students to use it [the technology]." "[…] and furthermore it [in general] can be challenging to make the students use the technology to ask questions or write about their challenges"* (Teacher L – author's translation). She argued that the students were not completely motivated to do the kind of reflective activity she had put forward, and if the technology is not straightforward then it is even harder to make them do the activity as intended. She also commented on the challenge of using a technology outside Moodle, because she sees a limitation in the fact that students then need to learn and adopt yet another system, which in this case was Etherpad. Schroeder et al. (2010) stress that externally hosted applications that do not become part of the VLE platform can be seen as a threat. I think that if the external technology or application is somehow integrated into, for example, Moodle then it creates a transparency and becomes a natural hub between applications and technologies. Another issue influencing this is the time needed to integrate the technology into the course design, and perhaps not so much the technology in itself, but the activities that are supported by the technology.

Teacher L assumed that using Facebook had a side effect, because there is a chance that the students will use Facebook for non-educational purposes during the lectures and not be active in the lectures; however, the activity level on Facebook was rather high in the activity she used, which thus had the opposite effect. Compared to the challenge of using technology outside the main e-learning platform (Moodle), Teacher L also believes there are more students that make comments, and by using

different platforms we might give these students the opportunity to come forward with their opinions or questions in both an online and face-to-face forum.

Another comment with regard to the technical challenges was that to many people, Web 2.0 technology and mediated learning is a new media with unknown new functions, and there are technical issues that I, as a technological specialist and researcher, know more about and that the teacher does not know about, as they are more focused on the academic content. As noted in Article III (2013), one of the teachers suggested that there could be a secretary at the institutional level who might be able to undertake the practical elements of setting up the virtual space for a given activity, but this could be in conflict with other work obligations.

How should we deal with such challenges? This introduced the need to scaffold teachers in developing their knowledge of practice regarding design for learning using technology. It is essential to facilitate and scaffold teachers when implementing new technology and integrating Web 2.0-mediated learning by offering them both technologically and pedagogically competent discussion and feedback from a qualified and competent consultant or scaffolder. As one of the teachers noted, *"[…] to initiate activities such as this takes up time, and it can be a challenge to get started and be inspired to do it. It has been nice to have someone to help with starting this activity technically as it is a barrier to getting started"* (Teacher G – author's translation). It is not only the technology that is an issue, however, and she continues: *"it needs IT people to have a pedagogical knowledge as well to be able to facilitate. […] this combination will be beneficial. I believe that is what is needed. [And] I believe it is important to invest some IT facilitation to enable teachers to use social media in teaching"* (Teacher G – author's translation).

In more general terms, the feedback from the teachers in this research project noted the possibility of having people from outside, with a technological and pedagogical background, involved in the activities, and some of the teachers even suggested that the activity would not begin if the support was not there. It may seem difficult to cope with this kind of issue along with the planning of one's teaching, and the different things to be considered regarding the activity could be overwhelming. As noted in all my articles (Buus, 2012, 2015; Dohn & Buus, 2013), my first analysis shows that the collaboration between the teacher and myself as the researcher and technical-pedagogical facilitator made the set-up of the activity possible. Of course I again need to stress the idea of the two roles I held and the power relations in play when, as researcher, I investigate 'what happens?' and as the technical-pedagogical facilitator or scaffolder support the teachers in their design for learning. It is a balance I need to be aware of in my interaction with the teachers and my own observation and critical reflections. Using the method of action research does not provide answers to this; on the contrary it is a known point of awareness in this method within the field of education (Denzin & Lincoln, 2000).

In Article III by Dohn and Buus (2013) we state that my research shows that teachers need even more scaffolding and further follow-up, which was supplied in my methodological research approach in this dissertation, but will demand institutional resources and facilitators or scaffolders with technical, pedagogical and collaborative skills. It make reflections back to my first research question where I asked *"How can I conceptualise the scaffolding of teachers in planning and introducing 'new learning designs' combining PBL and Web 2.0?"*, because there seem to be a need to scaffold teachers conceptually, technologically and pedagogically, when ICT needs to be integrated.

Organisational perspectives are another theme identified in the challenges to the teachers integration of Web 2.0 technology, and these were also briefly touched upon in Article III (Dohn & Buus, 2013). I found different perspectives within this theme, which also presents challenges at another level. One of the perspectives concerns the way one teacher feels in the absence of clear practice about technology integration in courses. The teacher believed the individual institution needs to take into consideration how Web 2.0 technologies or software in general would be of relevance to the students during their study and maybe even afterwards. He noted that institutions *"need to take organisational discussions and decisions on Web 2.0 technologies or software in general in the same way as it is done with literature and the academic theoretical perspective"* (Teacher R – author's translation).

Another organisational concern is that among the teachers there are different ways to handle, for example, e-mails, and as one of the teachers points out, *"if you deal with emails in an analogue way then this activity will not save time but will increase the time you spend on teaching"* (Teacher R – author's translation), and from his point of view the average age of the staff in some institutes makes it a challenge when integrating new technology and new kinds of activities in teaching. There are many who have an analogue way of working even if they use technology for their work. They do not take advantage of the flexibility of having email on their smartphones, for example, and the ability to answer on the move, so that having more emails via social media such as Facebook or other forums will just challenge their way of working.

In line with this there is also the challenge of merging one's professional and personal life, which can be seen from both the teacher's perspective and also from that of the students. For example, as touched upon in the ethical issues, the use of Facebook for educational purposes presents a challenge as many students use it for private purposes, and so do teachers. One way to deal with this is to create both an educational profile and a personal profile, which was the solution used by one of the teachers using Facebook in her activity. In one of the activities where Facebook was chosen there were students who did not want to use their private Facebook profile for educational purposes, and did not create a study profile; this raised a question about whether the institution has the right to require this, and potentially exclude

someone from the intended learning. What if the technology is not hosted in an organisational context? This is an interesting question, which I will not elaborate on here, but I will return to this in future research about the potential and conflicts of integrating Web 2.0 in teaching and learning.

6.2. SUMMING UP AND REFLECTING ON THE FINDINGS

The themes of both potential and challenge, which I have identified in the further analysis of my data, can be listed:

Table 4: The potential, challenges and tensions derived from my latest data analysis

Themes	Potential	Tension
Student skills and competences	• Within writing, sharing, collaborating, interacting, networking, etc.	• Awareness about the educational setting compared with the Web 2.0 ideals • Consider plagiarism, literature, references, "patchworking" from materials
Actively participate in and reflect on one's own learning	• Encourage students • Provide new routines for reflection	• Teacher intentions vs. students expectations – explicitly need to align these
PBL or not?	• May be more in line with PBL on a basic level (traditional teacher-centred PBL) • Be closer to the students and facilitate their group work using Web 2.0 in teaching	• The role of the teacher in a PBL setting vs. a Web 2.0 mediated learning setting • Develop learning objectives that accommodate the educational requirements and the learning inherent in the learning activities
Online teacher collaboration	• Easier to support teacher collaboration • Better scaffolding of the student learning	• Ethical issues such as the use of ones private profile vs. establishing a professional version.

Documentation	• Young people document a great deal using pictures and video – use this in the teaching • Maintaining and sharing knowledge • Reuse video documentation for future learning scenarios	• Methods of evaluation, assessment and criteria accordingly to the logic of Web 2.0 vs. logic in the educational settings
Framing	• Teachers need to clearly frame and actively be involved to make learning happen as intended • Both time-saving and time-consuming • Give students responsibility for own learning	• Explicitly define the role of the teacher and what students can expect in regard to the learning objectives and activities • Explain expectations to the students and their role • Time from different perspectives (students, teachers, course, etc.) as a tension • Create alignment between learning objectives, learning activities and evaluation formats
Communication	• Awareness of the strength and weaknesses in written vs. spoken communication within different contexts • Written things appear stronger • Easier to grab and elaborate on ideas spontaneously in the spoken communication • Balance the teacher workload in replying to every posting	• The power of written vs. spoken dialogue – and the importance of training this way of communicating • Evaluation – "who" is to do the evaluation – expectations in educational vs. Web 2.0 logical settings • The teachers pedagogical and academic responsibility
Technical challenges	• A need to scaffold teachers to overcome the barrier of Web 2.0 technologies and inspire and share knowledge	• Develop transparency between the technological barriers teachers face and the learning activities initiated

	about possibilities with new technology – combining support for both pedagogical and technical inspiration • Student motivation (and skills) for using new technology for academic purposes	• Develop awareness of the theoretical tensions involved and the practical implications in Web 2.0 mediated learning activities • Teacher responsibility to scaffold student learning with Web 2.0 mediated activities in educational settings • Develop teacher competences to design pedagogical Web 2.0 mediated activities and the ability to handle them technological, pedagogical and communicatively • Awareness of the need to scaffold teachers and when scaffolding no longer is needed
Organisational perspectives	• Need a clear organisational strategy for integrating Web 2.0 and ICT in general in teaching • Teachers way of working – "analogue" or "digital" • Ways to cope with one's professional and/or personal online profile in an academic context	• Balance the organisational expectations, teachers competences and student learning – dealing with macro-meso and micro levels

In the themes identified I will claim a certain amount of dynamic interdependency. For example, being closer to the students and facilitating their group work depends on the active participation of the students and their engagement in the activity, and in addition to this the scaffolding of student skills and competences, which also demands participation and reflection. The need for teachers to frame the teaching and participate actively to engage the students correlates with PBL in the traditional, more teacher-centred approach, and additionally depends on whether the technical challenges are overcome from both teacher and student perspectives, when talking

about using Web 2.0 technology for learning activities. There is a tension in the power relationship between the teacher and students when looking at PBL ideals, as my research and analysis show a need for teachers to frame a design for learning for the students learning process, and explicitly introduce this to the student together with the evaluation and assessment focus in the learning process. At the same time teachers needs to take PBL into account as the learning approach, but as noted earlier I see this more in an active learning perspective still building on both PBL and Web 2.0 terms. There seems to be a general lack of student motivation or engagement to interact as intended in all the three cases when the teacher initiated the activity, but on the other hand this seems to be progressing when the activity was repeated in the cases where there are more than one iteration. Again factors such as new students with another approach to the learning style or more involved teachers can influence this, and presumably teachers become more aware of the need to clearly define learning objectives vs. initiating activities and the evaluation criteria, but more research needs to be done to explore this more deeply and identify any pattern.

Relating these findings to the combination of the ideology and terms of Web 2.0, PBL and networked learning, I deal with the terms *participation* and *interaction* regarding reflections, scaffolding skills and competences, and actively participating according to one's own learning progress. The terms *network*, *sharing*, *collaborating* and *cooperating in a social context* are noted by the teachers as points of awareness in the learning design when talking about student skills and competences, and this shows that there is learning potential in the integration of Web 2.0 into PBL.

One case-study did not approach the course or activity from the perspective of integrating PBL into teaching, which was also concluded in Article III (Dohn & Buus, 2013). Ertmer and Simons (2005) emphasised the need to also scaffold teachers when they integrate PBL, and point to three challenges that teachers often face when having problems implementing a PBL approach in their teaching. One of these is time, because it takes time to actually implement and design for problem-based experiences or activities. Another is to actually make the students active and actively participate, and finally there is the issue of effectively assessing student learning. The level of participation in the activities and sharing of knowledge as intended by the teacher may be more distributive than collaborative and this can be a tension for the teacher in their role as authoritative and experts accomplishing students expectations, and furthermore explicitly make students clearly aware of the change in the teacher's role, as, for example, facilitator of dialogue or what the teacher expects from the students, and then scaffold the activity or process to a greater degree. Ertmer and Simons (2005) note an issue causing tension between Web 2.0 and learning practices that was also noted by Dohn (2009), who asked "*how to evaluate the work done by students*". Dohn reflected on the correlation of tension and participation, as when taking a Web 2.0 approach participation would be

considered a criterion for evaluation, but if it is seen from a learning perspective evaluation also requires evidence of knowledge, competences within the field and quality of content. On the other hand there also is a consideration of "who" is to undertake the evaluation or the 'quality check' where the teacher can have different roles, as in the one case where the teachers asked the fellow students to comment and qualify their comments before he answered himself. No matter which way it is done, the teachers will always have a pedagogical responsibility towards the student's learning.

With these findings in mind I looked at the literature to see what experiences others might have had in line with my own. In an investigation conducted on 20 social software initiatives in the UK in higher education, Schroeder et al. (2010) identify some of the same issues that I found in my analysis. They focus on strengths, weaknesses, opportunities and threats using Web 2.0 (or social software) in teaching and learning. One of the strengths Schroeder et al. (2010) found in their data involves improved learning. They stress that when using social software or Web 2.0 they see new or improved learning practices emerge, and that Web 2.0 gives students the ability to share, comment on and integrate new perspectives in, for example, group work, and reflect on one's own learning (Schroeder et al., 2010, p. 164).

Another strength Schroeder et al. (2010) identified is that teachers have the chance to online follow the interactions and contributions of the students, which gave the teachers an opportunity to intervene, facilitate and guide the students in the right direction in their learning experience. This makes the teacher closer to the students, which my findings also suggest has learning potential. As I also found in my data, it is not enough to set up the activities and believe the students themselves will simply collaborate and share, without also clearly defining, supporting and engaging actively in the activity and the use of the Web 2.0 tools. Schroeder et al. (2010) identified the same thing in their analysis, and they furthermore stressed that it is important to note and be aware that the strengths in Web 2.0 software do not emerge by themselves, but need to be discussed in relation to the learning design, and which tools support which activities, and that it needs to be aligned with the learning outcomes of the learning unit.

Using Web 2.0 also presents challenges or weaknesses, which Schroeder et al. (2010) touch upon, and which furthermore are in line with some of the challenges I found. One of the primary concerns is related to the workload and the time teachers need to invest in the integration of Web 2.0-mediated activities – time to design the activity, become familiar with the Web 2.0 technologies and participate in, facilitate and evaluate the activity as well. Some teachers are aware of the time and workload, but as also noted by Schroeder et al. (2010, p. 166) there needs to be formal institutional support available. My study shows that it is possible to empower teachers by scaffolding them within the domain of a technological-pedagogical

approach, and that this scaffolding needs to be done through close collaboration between the teacher and the scaffolder. Organisations intending to upgrade teacher competences within Web 2.0-mediated learning or maybe even in general within ICT-mediated learning, indications in my research show that collaborative project might be a worthwhile approach, even if it is demanding in terms of resources. My research furthermore shows that teachers wish even more scaffolding than the amount I supplied for them.

In continuation of the time and workload issues, Hack (2013) found that one of the main reasons that teachers don't use technologies is time. She stresses that teachers are not willing to invest the time in developing the skills for using ICT or Web 2.0 technologies in their teaching unless they have an appreciation of the benefits in the technology. Teachers also find that actually having a lack of time or a heavy workload combined with insufficient IT skills and support stops them from integrating Web 2.0 technologies into their teaching.

My study, conducted together with Khalid (submitted), mapping barriers to the integration and adoption of ICT in educational settings at the macro, meso and micro levels shows that barriers within this area involve multiple levels of the educational system in order to address positive outcomes. This is very much in line with what one of the teachers demanded, namely a clear organisational strategy for integrating Web 2.0 and ICT into teaching practices and discussion about putting technology at the same level as considering literature in a course.

Talking about teachers and their hurdles to technology and integration or adoption in their teaching, both Hack (2013) and Ertmer and Simons (2005) describe positive experiences with the use of what can be defined as CoPs, or teachers collaboratively learning from each other in ICT matters. This means of approaching ICT in a collaborative context provides the opportunity for teachers to collaborate and gain inspiration, skills and hopefully confidence in using Web 2.0-mediated activities and technologies in their own teaching. This also provides them with an understanding of what the students face when they are introduced to Web 2.0-based activities and technology.

Conole and Alevizou (2010) claim that although many of the students of today have grown up with technology as part of their everyday life, they do not necessarily have the skills to be able to utilise it in an academic and learning context. There is often a comprehensive range of learners who have different preferences for the ways they would like to learn (learning styles), but also for how and the degree to which they wish to integrate and interact with technologies in their learning context, combined with their individual level of common study and academic skills.

Jones also (2012) stresses that young students in higher education settings are not adopting new technologies or recent innovations, and furthermore that they are not

necessarily skilled in the latest technologies either. He also refers to research by Margaryan, Littlejohn and Vojt (2011), which found that regardless of student age and their study discipline, their attitude to learning seems to be mainly affected by the teacher's pedagogical approach and learning design (Jones, 2012, p. 37). It thus cannot be assumed that students simply adapt to new technology on their own or have the ability to do so.

One of the things I observed when following the online environments and the student interactions was that the student engagement to continue using the online environment was established for both educational and social communication after the course had finished, which Schroeder et al. (2010) also identify in their findings. There were two occasions where this did not happen, but one was caused by a natural ending in the use of the blog, and the other because the community of students fell apart in the online dimension.

So far I have compared my findings about Web 2.0, PBL and networked learning with those of other literature studies. I have also identified some aspects of my findings that are unique in this research or not explicitly noted in the literature I have seen on Web 2.0-mediated learning. The participating teachers have been aware of the strengths and weaknesses in the communication, and note this as one of the ideas to be aware of in one's learning design. The spoken word is more easily forgotten than the written word, which remains and thereby has a stronger representation. One of the teachers noted that he posted a reply regarding one of the student objectives, but it appeared a little aggressive online, or at least it was understood as aggressive, which had the effect that the students came to the teacher in frustration. This, you could say, was a lucky outcome, but at the same time it shows the strength of the written word.

Another dimension is the theme of documentation where the teachers talk about integrating this more into their teaching as a way to maintain and share knowledge, which can be both individual and collaborative, and also use it in learning scenarios for students new to PBL and exam situations at AAU. This becomes relevant and really important when talking about international graduate students coming to study at AAU for their master's degree not familiar with the educational pedagogical culture at AAU.

As Savery (2006) states:

> *"[...] learners new to PBL require significant instructional scaffolding to support the development of problem-solving skills, self-directed learning skills and teamwork/collaboration skills to a level of self-sufficiency where the scaffold can be removed."*
>
> *(Savery, 2006, p. 15)*

Taking this further, learners (in this situation teachers) new to Web 2.0 mediated learning require significant technological and pedagogical scaffolding to integrate the practice of Web 2.0 in a learning context and combine this with the PBL ideology in order to be able to gain skills to scaffold student learning processes and become themselves, and also teach students to be, self-sufficient enough to remove the scaffold. At the same time I presume that teachers involved in designing for learning using ICT or Web 2.0 mediated technologies can design learning activities scaffolding people's learning process, but whether the learner actually learns what the teacher intended when they initiated the learning activity cannot be determined beforehand: it will only ever be shown in an assessment or evaluation.

I have tried to illustrate this in Figure 12, which is an elaboration of my role as scaffolder (illustrated in Figure 10), which was to look at scaffolding progression more generally.
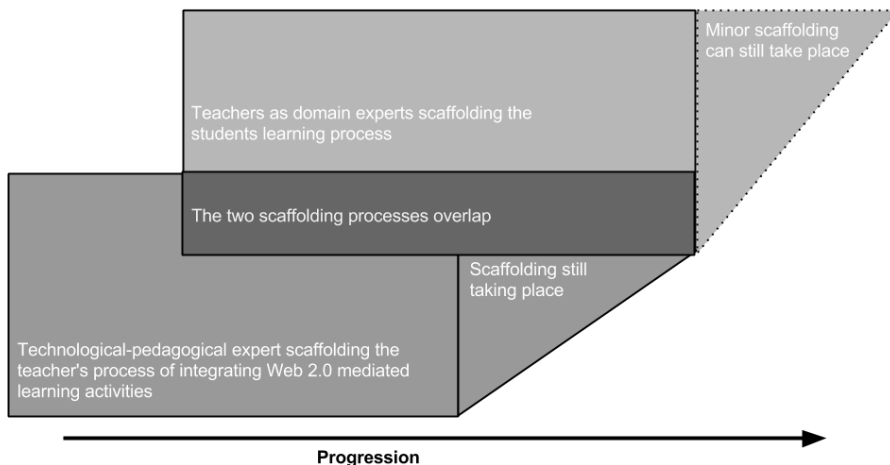

Figure 12: The scaffolding process for both technological-pedagogical experts and teachers, and for teachers and students

Considering the process of the scaffolding progression in my research make me think that the teachers gained knowledge about the technology and the pedagogical tensions, which they pass on in the new iterations of the learning activities. It is important to note that it is the activities that are the key focus in the model and not the technology. This furthermore demands a focus on the important professional knowledge of the teacher, which needs to be scaffolded by the technology. On the other hand one of the challenges I met was the idea of when to 'take down the scaffolding' to allow teachers to be self-sufficient. When taking non-metaphorical scaffolding down it is important to establish it as safe in the construction, but it needs to be removed when the constructions is finished. It might even be seen as a

tension that the scaffolding needs to be "taken down" at some point, which means that teachers needs to be self-sufficient, or else it can not be defined as scaffolding but as permanent support, which can be important to distinguish. This balance of when to let go can be hard, as some might need the scaffolding for a longer period of time than others.

The composition shown in Figure 12 is often not part of the scaffolding for teachers. Organisations often do not give teachers time to create their technological and pedagogical learning design or provide the right support to scaffold teachers in this. The norms in curriculum often note the integration of ICT without taking the challenges into account and giving teachers the necessary support for integrating ICT or Web 2.0 mediated technology.

CHAPTER 7.

With my research question in mind in this chapter I will conclude and reflect on my research and my journey in learning. I will explain the ways in which my research contributes to existing research within the area of PBL, networked learning and learning design based on the findings from my data and my research in general. Finally, I will briefly discuss future possible research directions that have emerged from my research.

7.1. CONCLUDING REFLECTIONS AND REMARKS

If I start by looking at my research from an overall perspective, a discussion with my supervisor inspired me. My supervisor described my research as a triple co-construction between PBL, learning design and action research within the area of networked learning. Thinking again about this, this means that I am looking at PBL and networked learning, which among other things are based on collaboration and knowledge sharing. I have a perspective on knowledge as being socially constructed, which has been my approach throughout my research process. My approach to looking at this is based on methods where collaboration also has a great impact. The method supports the perspectives from PBL and networked learning about knowledge as being socially constructed. Combining this enhances interdependence and creates a complexity in my research, which has been able to lead me in many different directions depending on the movement and direction of the "elements" in motion. "Elements" relate to the intentions and starting point of my research process, the collaboration process, progress and outcome, and the interactions taking place between the participating teachers and myself as researcher.

To follow up on this I will restate the last part of my research questions first, which contribute to different practices and areas of awareness when integrating Web 2.0 in a PBL context. My research contributes in the theoretical area of networked learning and PBL. My questions were: "*What is the learning potential of integrating Web 2.0-mediated learning in a PBL approach?*" and "*What kinds of challenges do teachers experience when integrating Web 2.0-mediated PBL-based activities into their practice?*"

At the beginning of my research I claimed that the ideology of Web 2.0 provides research opportunities to study phenomena such as *collaboration*, *active students* and *user participation*, and from my theoretical foundation based on PBL and networked learning I have added even more to the list of phenomena that can be seen within the area of Web 2.0. This includes terms such as *student-centred (user-*

generated) content, *active participation (creating)*, *interaction (group work)*, *engaging in (social) networks* and *sharing of knowledge.*

Based on the findings in my research as presented in the articles and Chapter 6, this claim has proved to be valid. My research demonstrates that Web 2.0 mediated activities contribute to learning within PBL and networked learning, even though the PBL approach might be more traditionally teacher-centred, but creates close relationships within student group work.

I have identified various learning possibilities when combining Web 2.0 and PBL from a networked learning perspective. The learning potential shows that this combination of Web 2.0, PBL and networked learning is able to develop and enhance different student skills and competences, supporting the ideology within the two areas of pedagogy, although it will depend on the activities initiated, developed and implemented by the teacher in the learning design. Some of the possibilities identified are the strengthening of the student skills and competences within collaboration, and sharing between the students; at least to some extent. Framing an online space for reflections, information and collaboration, and scaffolding students in this way of working supports this potential.

I have also identified some challenges or tensions, which can be seen as important points of awareness in the learning design process and in future research into educational development with Web 2.0 mediated learning. There is a need to deal with the tensions and challenges, not least by raising teacher awareness of their existence. In Article III the following key questions were raised for such research:

> *"Develop teacher awareness of the theoretical tensions involved in Web 2.0-mediated educational activities and their implications in practice;*
>
> *Develop learning objectives that accommodate both educational requirements and the view of knowledge and learning inherent in Web 2.0 activities;*
>
> *Create alignment among learning objectives, learning activities, and evaluation formats;*
>
> *Develop teacher roles and participation forms adequate for these learning objectives and activities; and*
>
> *Develop teacher competences so that teachers can themselves design pedagogical Web 2.0-mediated activities and can handle them technologically, pedagogically, and communicatively."*
>
> *(Dohn & Buus, 2013, pp. 253–254))*

These points of awareness also relate to the tensions involving teacher frustrations about the student's academic level of interaction, which need consideration in light of using a sometimes private media for educational purposes. Expecting the students to acknowledge the educational norms created some constraints in the interaction, which was accommodated by introducing a more teacher-led discussion, which turned out not to be needed after all. The awareness was important, however.

In Chapter 6 different possibilities and tension was identified, presented and discussed, trying to give an overview of these according to the different themes identified. See Table 5 for a look at the potential and tension found.

Table 5: Potential and tension identified

Potential	Tension / challenges
• **Within writing, sharing, collaborating, interacting, networking, etc.**	• Awareness of the educational setting compared with the Web 2.0 ideals • Consider plagiarism, literature, references, "patchworking" from materials
• **Encourage students** • **Provides new routines for reflection**	• Teacher intentions vs. students expectations – explicitly need to align these
• **May be more in line with PBL on a basic level (traditional teacher-centred PBL)** • **Be closer to the students and facilitate their group work using Web 2.0 in teaching**	• The role of the teacher in a PBL setting vs. a Web 2.0 mediated learning setting • Develop learning objectives that accommodate the educational requirements and the learning inherent in the learning activities
• **Easier to support teacher collaboration** • **Better scaffolding of the students' learning**	• Ethical issues, e.g. the use of private profiles vs. establishing professional versions.
• **Young people document a great deal using pictures and video – use this documentation method in the teaching** • **Maintaining and sharing knowledge**	• Methods of evaluation, assessment and criteria accordingly to the logic of Web 2.0 vs. logic in the educational settings

• **Reuse video documentation for future learning scenarios**	
• **Teachers need to clearly frame and actively be involved to make learning happen as intended** • **Both time-saving and time-consuming** • **Give students responsibility for own learning**	• Explicitly define the role of the teacher and what students can expect with regard to the learning objectives and activities • Explain their expectations to the students and their role • Time in different perspectives (students, teachers, course, etc.) as a tension • Create alignment between learning objectives, learning activities and evaluation formats
• **Awareness of the strength and weaknesses in written vs. spoken communication within different contexts** • **Written things appear stronger** • **Easier to grab and elaborate on ideas spontaneously in the spoken communication** • **Balance teacher workload in replying to every posting**	• The power of written vs. spoken dialogue – and the importance of training this way of communicating • Evaluation – "who" is to do the evaluation – expectations in educational vs. Web 2.0 logical settings • The teacher's pedagogical and academic responsibility
• **A need to scaffold teachers to overcome the barrier of Web 2.0 technologies and inspire and share knowledge about possibilities with new technology – combining support for both pedagogical and technical inspiration** • **Student motivation (and skills) in using new technology for academic purposes**	• Develop transparency between technological barriers teachers face and the learning activities initiated • Develop awareness of the theoretical tensions involved and the practical implications in Web 2.0 mediated learning activities • Teacher responsibility to scaffold student learning with Web 2.0 mediated activities in educational settings • Develop teacher competences to design pedagogical Web 2.0 mediated learning activities • Develop teacher ability to handle pedagogical Web 2.0 mediated learning activities technological, pedagogical and communicatively

	• Awareness of the need to scaffold the teachers and when the scaffolding no longer is needed
• **Need a clear organisational strategy for integrating Web 2.0 and ICT in general in teaching** • **Teacher's way of working – "analogue" or "digital"** • **Ways to cope with one's professional and/or personal online profile in an academic context**	• Balance the organisational expectations, teachers competences and students learning – dealing with macro-meso and micro levels

Challenges can, as also shown in my research, be on different levels (macro, meso and micro level (Khalid & Buus, submitted)), in which individuals (teachers) and organisations (institutions) require different levels of involvement. On the macro level the organisational involvement will be to incorporate directions for the integration of Web 2.0-mediated learning activities into the curriculum, but this will have to be supported on the meso and micro level. It could be required via an organisational support unit at the meso level, which can scaffold teachers on the micro level in their integration of Web 2.0-mediated learning activities. It is important to see the three levels as interdependent, creating a holistic perspective in the integration of Web 2.0 into teaching. The perspectives of scaffolding can be seen at the micro level, and could be organised via the university pedagogy course for assistant professors or an independent pedagogical-technological support unit, that can establish the scaffolding possibilities. The perspective of macro, meso and micro levels may be related to the process of action research, as action research as a method can be foundational for organisational change at all three levels. In my research action research has primarily had an impact at the micro level, as I have been using action research in the scaffolding process. A focus seems to have evolved in organisations on the need for scaffolding teachers, as institutes request for consultants in using Moodle more effectively from both a pedagogical and technological perspective.

I will follow up on this by restating my first research question, *"How can I conceptualise the scaffolding of teachers in planning and introducing 'new learning designs' combining PBL and Web 2.0?"*, The outcome of which is a learning design methodology for scaffolding teachers integrating Web 2.0-mediated learning that builds on an existing collaborative e-learning design method. This method will be represented at the micro level, where teachers design the activities for their learning. I found that using a collaborative and action research-based method for scaffolding teachers is a useful approach to integrating Web 2.0 or ICT into teaching and learning. Using this method, a close relationship between the teachers as participants

and myself as the researcher emerged. This builds on mutual dialogue, inspiration and knowledge exchange during the design and implementation of the activities, but also an exchange of observations and reflections on the online interactions taking place in the learning environments. This meant that in the collaboration we came up with adjustments to create an improved learning environment for the students to interact within. Using the collaborative approach further strengthened the teachers in relation to their technical barriers. I know that the teachers carried on the activities, and that one teacher also had more technical support during the research process.

The collaboration between the teachers and myself as a researcher was also fruitful in the sense that the activities developed were accomplished with a different degree of success, as not all the activities unfolded as intended and expected, but at the same time the activities and the results enriched the teachers' awareness of designing for learning. In general, the teachers found value in our collaboration. The collaboration in a scaffolding approach stressed some tensions in the relationship between the teacher as domain expert and myself as the domain novice who needed to learn the domain to qualify the collaboration to be able to scaffold the teacher's novice level of knowledge within Web 2.0 mediated activities and technology, and myself as the expert in this domain. In my role as researcher, I had to gain knowledge and also try to be neutral in my role as scaffolder in order to maintain and balance awareness of the roles and the power balance in these changing expert-novice relationships in the scaffolding process.

Based on my interest in scaffolding I illustrated the progression of scaffolding in my research and in an educational setting. Figure 13 shows the two almost parallel processes, and also draws attention to the power relationship just noted. It is intended to illustrate the tension in the progression and when to remove the scaffolding and acknowledge that the teacher has become self-sufficient. Often the fundamental part of scaffolding teachers in integrating ICT and Web 2.0 mediated learning is missing.

Combining scaffolding with action research provides space for planning, experimenting and adjusting accordingly during the scaffolding process but also during the process of designing for learning, when issues are reflected upon. As the scaffolder I need to balance and build the scaffold in respect to the progression, interactions, and reflections so as not to either over- nor underestimate the structure of scaffolding.
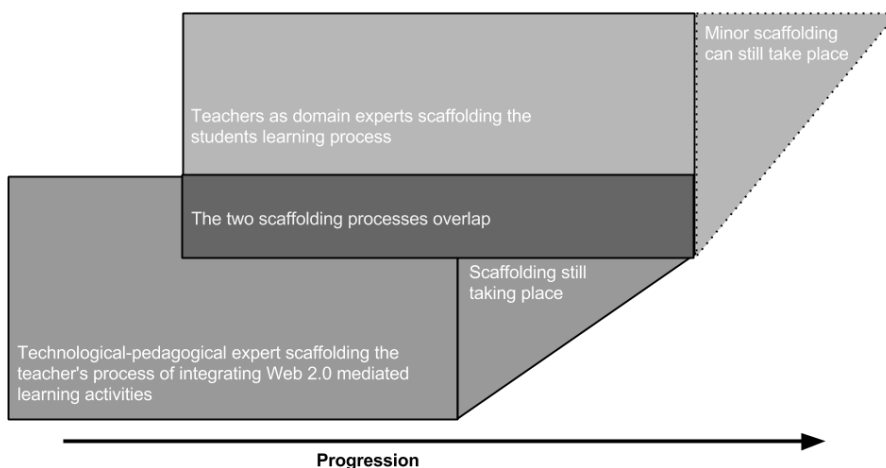
Figure 13: The model of scaffolding in education

One concern regarding my specific methodological approach to scaffolding the teachers is the scalability, which is touched a little upon in the conclusion of *"Introducing the Collaborative E-Learning Design Method (CoED)"* by Ryberg et al. (2015). Scalability will need to be organised on an even more strategic level, and with an even more strategic plan when using CoED and action research in combination.

In my analysis the choice of only analysing this from the perspective of the teachers may be a failure in using action research in education according to Kemmis (2006). From his point of view it is important to make improvements in practice as both the professional practitioner (domain experts) and the people involved in the practice (learners). I chose to focus on the teachers and only invited the voice of the students in a questionnaire, which seems to have been a success although the collaboration and the co-researching was on going, as mutual respect for the individual domains emerged, and all those concerned gained knowledge from each other. Although action research as method also has some challenges when trying to balance the role as researcher and scaffolder. I found that the two roles could be hard to balance, and I think my main role in the collaboration and interaction with the teachers has been as the scaffolder, and the research element has been when reflecting on issues to bring into the discussion and evaluations of the processes, together with my conducting the interviews.

The general concept that learning design builds on activities, collaboration and workflow, combined with awareness within the areas that Mor and Craft (2012) specify, combined with further development of my learning design methodology based on the CoED learning design method could be a future issue to develop and investigate. A colleague of mine, Thomas Ryberg, has already been giving this of

thought and has outlined some ideas to make the method even more concrete, in tandem with creating a sustainable learning design. I think it would be interesting to further collaborate on this in new projects.

From the organisational perspective there needs to be a support facility to scaffold teachers in developing and implementing their learning design, and to be able to interfere and raise questions to make teachers reflect on their learning design according to the inherent tensions identified. It is important as the "scaffolder" to have competences within the areas of pedagogy and technology, but also to further prepare the ground for teachers with little interest in ICT and scaffold their pedagogical-technological-based design for learning, so that they are able to scaffold their interaction with learners. As noted here in Part 1 and in Article III by Dohn and Buus (2013), my research shows that teachers need even more scaffolding than that offered during my research, and I would like to keep in mind the philosophy:

> **"We cannot design learning we can only design for *learning*"**
>
> *(Dirckinck-Holmfeld & Jones, 2009, p. 277)*

Interesting issues appeared in my research process that could be seen as themes for further investigation as a spin-off from this dissertation. One could be to clarify and discuss the pros and cons of using an organisational platform vs. open or web-based platforms not hosted by the organisation, when ICT or Web 2.0 technology is integrated into teaching and learning activities. This can be seen in addition to the scaffolding of teachers, and the organisation. Perspectives on hosting internally or externally in the organisation have often been discussed, because among other things they also raise different ethical issues.

I briefly noted the ethical issue regarding the use of, for example, Facebook as a medium for educational purposes. How will you as a teacher cope with having both a professional and perhaps also a private profile on this medium? What are the ethical issues of concern when you are "friending" students, and obtain access to their world outside university? What about the data put on Facebook or other social media regarding educational perspectives? This can be brought further into a discussion about the organisational issues in using social media such as Facebook. Many different perspectives on ethical issues can be raised.

My research focused on the teachers, but there could also be a focus on investigating students and their use of technologies in learning activities initiated by the teachers in a course context, if seen from the AAU perspective, and what Kemmis (2006) notes will be the holistic way of using action research. There has been research by a PhD fellow, Nikorn Rongbutsri, who asked students about their use of Web 2.0 technologies for collaboration and project work (Rongbutsri, Khalid & Ryberg, 2011). Based on that research we collaboratively wrote an article showing the

availability of Web 2.0 technologies in proportion to different phases in AAU's project PBL approach (Khalid et al., 2012). Further investigation concerning the other approach, asking "what happens in the course context?" which might even be compared with the outcome in this dissertation, could be a future follow-up.

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APPENDICES

Appendix A. Invitation to the kick-off workshop

Har du ind imellem overvejet om det var muligt at inddrage sociale medier i din undervisning?

- invitation til en indledende design workshop med mulighed for at blive inspireret til at inddrage sociale medier i undervisningen…

Hvad er sociale medier?

Sociale medier eller web 2.0 som det også betegnes, dækker over forskellige former for kommunikationsværktøjer som fx Forums, Blogs, Wikies, Chats, Tags, osv., hvilket måske allerede er kendt fra brugen af Moodle. I hvert fald er disse netop listede begreber alle nogle som er mulige at bruge i Moodle. Andre former for Sociale medier er f.eks. Wikipedia, Google Docs, Youtube, Facebook, etc. Samtidig dækker begrebet Sociale Medier eller web 2.0 over muligheden for online tilgang til og deling af ressourcer og viden.

Design workshop

I mit ph.d. projekt "*Udvikling af en læringsmetodologi indenfor den problem baserede læringstilgang med brugen af web 2.0 - læringspotentialerne med web 2.0 teknologier.*" arbejder jeg som titlen også antyder med læringspotentialerne indenfor brugen af sociale medier / web 2.0 i undervisning. Jeg vil derfor gerne indbyde til en design workshop.

Design workshoppen forestiller jeg mig som en del af et forløb, jeg har valgt at kalde "*At inddrage sociale medier/web 2.0 i undervisningen*".

Design workshoppen vil foregå:

   Torsdag den 7. april 2011 fra kl. 9.00 – 15.00 på Kroghstræde 1, rum 2.015

Tanken bag design workshoppen er at du vil få mulighed for at tænke web 2.0 teknologier og services kombineret med grader af PBL ind i din undervisningspraksis. Der er mange interessante spørgsmål, og derfor vil jeg være interesseret i at følge nærmere hvordan brugen af web 2.0 influerer på din undervisningspraksis.

Er du interesseret?

Jeg søger deltagere som er interesseret i at inddrage sociale medier eller teknologier indenfor web 2.0 i deres undervisningspraksis, og samtidig er interesseret i at jeg kan følge processen, og dermed vil det bidrage med data til min empiriske dataindsamling. Tanken er at design workshoppen skal være kick-off til en proces, som giver mulighed for at inddrage , afprøve og evaluere sociale medier / web 2.0 teknologier i brug i ens undervisningspraksis.

Jeg vil gerne have lov til at følge implementeringsprocessen fra design workshoppen til brugen i praksis, samt se på og analysere brugen i praksis. Jeg vil gerne have muligheden for at lave opfølgende interview med den enkelte underviser samt enkelte studerende. Desuden vil jeg etablere en spørgeskema undersøgelse senere i processen.

Til gengæld vil jeg være til rådighed i forhold til support og sparring i forbindelse med afprøvning af ideer og forskellige former for eksperimenter indenfor feltet.

Du kan via dette link tilmelde dig forløbet ” *At inddrage sociale medier/web 2.0 i undervisningen*”:

https://spreadsheets.google.com/viewform?formkey=dDAxd1lKR0J1SG9aOWZwO HoyR1BhVXc6MQ

Jeg håber du har lyst til at deltage og indgå i dette samarbejde med mig, og hvis der skulle være nogle spørgsmål er du meget velkommen til at sende mig en mail på (lillian@hum.aau.dk) eller ringe på 9940 8048

Jeg vil gerne have din tilkendegivelse om deltagelse *inden den 20. marts 2011* af hensyn til tilrettelæggelsen af workshoppen.

På forhånd tak

Mange hilsner

Lillian Buus

Appendix B. Programme for the kick-off workshop

Program til design workshop den 7. april 2011

- kick-off til forløbet: "*Inddragelse af sociale medier /web 2.0 i undervisningen*"

Tid	*Aktivitet*
09:00 – 09:15	**Velkomst og dagens program** **Kort introduktion til CoED metoden som workshoppen er baseret på**
9:15 – 9.45 **9.45 – 10:30**	**Fase 1** **Oplæg om social medier og web 2.0 ved Thomas Ryberg** **Introduktion til forskellige web 2.0 teknologier og aktiviteter samt overvejelser omkring sociale medier i undervisningen ved Lillian Buus**
10:30 – 10:45	*Kaffe pause*
10:45 – 10:50 **10:50 - 12:00**	**Fase 2** **Præsentation af case (5 min)** **Afstemning af pædagogiske værdier**
12:00 – 12:30	*Let frokost*
12:30 – 13:45 **13:45 – 14:15**	**Fase 3** **Design af undervisningsforløb i grupper** **Præsentation i plenum (10 min pr. gruppe)**
14:15 – 14:30	*Kaffe pause*
14:30 – 15:00	**Afslutning** **Opsamling på workshoppen og aftale om det videre forløb**

Appendix C. The value and design cards for the workshop

Listed below are the value and design cards that were presented to the participants at the kick-off workshop.

The cards were printed in sets for each group.

The value cards

Working with a curriculum	Working with real-life problems	Student control
Teacher control	Problem formulation by student	Problem formulation by teacher
Work process controlled by student	Work process controlled by teacher	Solution owned
Solution owned by teacher	Project work	"Skill and drill"
Result-centred learning	Active participation	Mutually interdependent
Learner independency	Collaboration	Cooperation
Technology-supported learning	Blended learning environment	Face-to-face teaching
Cultural contextualisation	Resource-based teaching	Open-source software
Resource-based learning	Informal learning	Formal learning
Process-oriented learning	Product-oriented learning	Competence development
Skill development	Measurable results	Hands-on
Interdisciplinary teaching	Commercial software	User-driven learning
Technology-driven	Self-motivated learning	Teacher-motivated

learning		learning
Teacher empowerment	Student empowerment	Social learning
Individual learning	Learning from theory	Learning from practice
Teachers as an instructor	Classroom teaching	Co-presence
Individual assignments	External collaboration	Mobile learning
Reusable content	Copyright protection	

The design cards

Activities (Red cards):		
Discussion	Feedback	Project work
Collaboration	Information Search	Multiple-choice quiz
Design	Planning	Assessment
Investigation	Simulation	Case study
Supervision	Written presentation	Oral/audio presentation
Video presentation	Group work	Face-to-face meeting
Blogging	Podcasting	User-generated content
Social networking	Micro-blogging	Online discussion
Writing portfolio	Collaborative writing	Online meeting
Exam	Tests	Summative assessment
Formative assessment	Mobile learning	Geo-tagging
Social bookmarking	Lecture	Assignment

Resources (Green cards):

External partners	Portfolio	Mindmaps
Wiki	Teacher	Students
Books	Library	Case descriptions
Chat-log	Messageboard	Course
Multiple-choice quiz	Video	Camera
E-mail	Forum	Databases
Survey tool	Internet sites	Tutorial
Manual	Simulation	Demonstration
Facilitator	Expert	Video chat
Text chat	Text editor	Spreadsheet
Game	Google Docs	Blog
Podcast	PDA	Touch screen
Game console	Google Apps	Videocast
Shared bookmark collection	Social network site	Micro-blogging site
Problems		

Infrastructure (Blue cards):

Smartphone	Intranet	GPS
Internet	PC	Portable media

LMS	Wireless network	Google Docs
Wiki	Blog	Social networking sites
Online learning environments	Location-based mobile services	Virtual worlds
Streaming server	Camera	ICT help desk
Microphone	Recording equipment	PDA
Mobile phone		

Appendix D. Questionnaire for students

In this appendix you can find the two different questionnaires that were given to the students in case 2 and case 3.

Case 2 questionnaire

Dear Student

I hope you will take a few minutes to help me find out about your impression of using a Facebook Group for Supervision and if you have used Diigo or/and Zotero during the e-Business course.

The information is used in relation to my PhD about Learning Potential using Social Media in Education.
My focus is on teachers but I would like to hear about your impression too.

The estimated time required to complete this questionnaire is between 5 and 15 minutes.

The survey is anonymous.

I will ask if I may contact you, and if you are interested in this you can insert your name and e-mail address. Please leave it blank if you want to stay anonymous.

Many thanks
Lillian Buus
PhD Student

General information

Gender

(1)   ❏   Male

(2)   ❏   Female

Age

(1)   ❏   -25

(2)   ❏   25–30

(3)   ❏   31–35

(4)   ❏   36–40

(5)   ❏   41–45

(6)   ❏   46+

Got here from Moodle or Facebook?

Did you get to this survey from the link in Moodle or from Facebook?

(1)   ❏   Moodle

(2)   ❏   Facebook

The Facebook Group for Project Supervision

Have you been using the Facebook Group for Project Supervision?

Yes   No

(1) ❏   (2) ❏

The Facebook Group for Project Supervision – if yes:

What is your overall impression of getting supervision this way?

Give a short comment on your impression.

_____
_____
_____
_____
_____

Did you get any answers from fellow students that you found useful for your further work?

(1)   ❑   Yes

(2)   ❑   No

Comment

Please give a short comment

_____
_____
_____
_____
_____

Did you get the answers from the supervisor (or other experts) you found useful for your further work?

(1)   ❑   Yes

(2)   ❑   No

Comment

Please give a short comment

_____
_____
_____
_____
_____

Please mention 3 things you find good about getting supervision this way...

1)   _____
            _____

2)   _____
            _____

3)   _____
            _____

Please mention 3 things you find problematic about getting supervision this way...

1) _____
_____

2) _____
_____

3) _____
_____

What did you think about using the Facebook group that you had already established for supervision purposes?

Please give a short comment

_____
_____
_____
_____
_____

The Facebook Group for Project Supervision – if no:

Please explain why you did not use the Facebook Group for Project Supervision

_____
_____
_____
_____
_____

What did you think about using the Facebook group that you had already established for supervision purposes?

Please give a short comment

_____
_____
_____
_____
_____

Using Diigo or/and Zotero?

Have you used Zotero or Diigo during the course?

(1)   ❑   Yes

(2)   ❑   No

Using Diigo or/and Zotero – if yes:

Which have you been using?

	Zotero	Diigo
Please choose one or both	(1) ❑	(2) ❑

In which way?

_____
_____

What was your impression of using this(these) tool(s)?

Give a short comment about your impression

_____
_____
_____
_____
_____

Please mention 3 advantages, in your view, of using this...

1)   _____
           _____

2)   _____
           _____

3)   ——————————————————————————
                  ——————————————————————————

Using Diigo or/and Zotero – if no:

Please explain your reason for not using either of these (Diigo or Zotero)?

——————————————————————
——————————————————————
——————————————————————
——————————————————————
——————————————————————

Thank you so much for answering this survey.

If you have any questions you are more than welcome to contact me at lillian@hum.aau.dk

If I may contact you to ask further questions about your use of the Facebook group or the other social tools, then please fill in your name and e-mail address.
If not, please leave blank for your anonymity.

Many thanks
Lillian Buus

Please leave blank if you wish to remain anonymous

Name   ————————————————————————————

e-Mail   ————————————————————————————

Case 3 questionnaire

Kære Studerende

Jeg håber du vil bruge nogle få minutter til at svare på et par spørgsmål vedr. brugen af Facebook (en lukket Facebook gruppe) til spørgsmål, dialog og feedback i forbindelse med kurset i Statsforfatningsret på AAU.

Informationerne skal bruges i forbindelse med min PhD som omhandler Læringspotentialerne med brugen af Sociale Medier i Undervisningen.
Mit fokus er på underviserne, men jeg vil meget gerne også have en fornemmelse af jeres indtryk.

Spørgeskemaet formodes at tage mellem 5-15 minutter.

Besvarelsen er anonym.
Jeg vil dog til slut i spørgeskemaet spørge om jeg efterfølgende må kontakte dig, og vil der spørge om dit navn og e-mail.
Hvis du ønsker at forblive anonym skal du blot lade disse felter være blanke.

På forhånd tak
Lillian Buus
PhD Studerende

General information

Køn

(1)   ❑   Mand

(2)   ❑   Kvinde

Alder

(1)   ❑   -25

(2)   ❑   25-30

(3)   ❑   31-35

(4)   ❑   36-40

(5)   ❑   41-45

(6)   ❑   46-mere

Kom hertil fra Moodle eller Facebook?

Kom du til spørgeskemaet via linket i Moodle eller fra Facebook?

(1)   ❑   Moodle

(2)   ❑   Facebook

Facebook Gruppen til spørgsmål, dialog og feedback

Har du gjort brug af Facebook Gruppen i kurset Statsforfatningsret til spørgsmål, dialog eller feedback?

Ja   Nej

(1) ❑   (2) ❑

Facebook Gruppen til spørgsmål, dialog og feedback - hvis ja

Hvad er din generelle vurdering og dit indtryk af at bruge en Facebook gruppe til spørgsmål, dialog og feedback?

Giv en kort forklaring på din vurdering og dit indtryk

_____
_____
_____
_____
_____

Fik du svar fra nogle af dine medstuderende som du følte du kunne bruge til noget for at komme videre?

(1)   ❑   Ja

(2)   ❑   Nej

Fik du svar fra underviseren som du kunne bruge til noget for at komme videre?

(1)   ❑   Ja

(2)   ❑   Nej

Følte du at underviseren var tilstede i Facebook Gruppen?

(1)   ❑   Ja

(2)   ❑   Nej

Giv gerne uddybende forklaringer

_____

Hvis du skal nævne 3 ting du finder godt ved denne brug af Facebook, hvad skulle det så være?

1)   _____

2)   _____

3)   _____

Hvis du skal nævne 3 ting du finder knap så godt ved denne brug af Facebook, hvad skulle det så være?

1) _____
_____

2) _____
_____

3) _____
_____

Facebook Gruppen til spørgsmål, dialog og feedback - hvis nej

Giv en kort forklaring på hvorfor du ikke har gjort brug af Facebook Gruppen til spørgsmål, dialog og feedback

_____
_____
_____
_____
_____

Mange tak fordi du valgte at besvare spørgeskemaet.

Hvis du har nogle spørgsmål eller kommentarer er du mere end velkommen til at kontakte mig - lillian@hum.aau.dk

Hvis jeg må kontakte dig for yderlig spørgsmål omkring brugen af Facebook Gruppen vil jeg bede dig udfylde nedenstående med dit navn og din e-mail adresse.
Hvis du ikke er interesseret i at jeg må kontakte dig vil jeg bede dig efterlade felterne tomme.

Mange tak
Lillian Buus

Efterlad felterne tomme for anonymitet

Navn _____

_

e-Mail   _____
_

Appendix E. Notes for the interview

These are the notes for the interviews conducted with the teachers in the three cases. The interviews were conducted as a dialogue between the teacher, and me. The questions were aimed mostly at getting some guidelines for the dialogue and ensuring getting the teachers impression and perspective on the activity and the relation to and notion of PBL within the activity.

Case 1

Noter til spørgsmål i forhold til interview med underviser i case 1

Indledningsvist vil jeg gerne have dig til at give en præsentation af hvad den eller de forskellige aktiviteter bestod i, som du har valgt at inddrage i det modul du har undervist.

På hvilken måde levede aktiviteten op til de forventninger du havde inden?

- hvad tænker du om de studerendes indsats i forhold til at inddrage aktiviteten?

- oplevede du aktiviteten supplerede de studerende?

På hvilken måde levede aktiviteten ikke op til de forventninger du havde inden?

Hvordan/på hvilken måde tænker du at disse aktiviteter (både de i lektionerne og de afsluttende i det psykologiske værksted) lægger sig op ad den PBL tilgang som kendetegner AAU?

Hvad tænker du at du som underviser har fået ud af at inddrage denne aktivitet i din undervisning/værkstedet?

Hvilke overvejelser gør du dig i forhold til evt. at skulle inddrage aktiviteten igen til næste efterår i samme undervisningsmodul? Overvejer du at inddrage aktiviteten eller elementer af aktiviteten i andre undervisningsmoduler? Forklar gerne hvordan du tænker om det?

Hvilke forestillinger forventer du de studerende har omkring aktiviteten?

Hvordan har du som underviser det med at skulle nå at læse/skimme indlæggene på så kort tid, samt give mundtlig respons på det?

Afslutningsvis:

Vil du kort kunne nævne 3 ting du fandt positivt ved at inddrage aktiviteten?

Vil du kort kunne nævne 3 ting du fandt problematisk ved at inddrage aktiviteten?

Case 2

Noter til spørgsmål i forhold til interview med underviser i case 2

Indledningsvist vil jeg gerne have dig til at give en præsentation af hvad de forskellige aktiviteter bestod i, som du har valgt at inddrage i det modul du har undervist.

De studerende var ret hurtige til at vælge FB som medie til deres supervision.

Kunne man forestille sig at det kunne være Google+ der kunne bruges i stedet for?

Eller er de studerende på Facebook? Og det var grunden til det blev valgt?

Hvad tænker du om måden supervisionen blev brugt på?

Vurderer du ud fra deres brug af det, at de var 'klar' til dette?

Hvad var vurderingen i forhold til de studerende der ikke havde opstillet et spørgsmål eller svaret - blev der spurgt indtil det ved eksamen.

Du placerede et spørgsmål på FB gruppen ved at bruge Poll funktionen - hvordan tænker du det virker? Er det noget du kunne forestille dig som en mulighed at inddrage mere (fra et underviser perspektiv)? Hvad tænker du om det svar der er givet - kan du bruge det til noget eller er det også et spørgsmål om hvordan spørgsmål bliver stillet?

Hvordan/på hvilken måde tænker du at disse aktiviteter (en af gangen) lægger sig op ad den PBL tilgang som kendetegner AAU?

Hvad tænker du at du som underviser har fået ud af at inddrage denne aktivitet i din undervisning/vejledning?

På hvilken måde levede aktiviteten op til de forventninger du havde inden?

På hvilken måde levede aktiviteten ikke op til de forventninger du havde inden?

Hvilke overvejelser gør du dig i forhold til evt. at skulle inddrage aktiviteten igen til næste efterår i samme undervisningsmodul? Overvejer du at inddrage aktiviteten

eller elementer af aktiviteten i andre undervisningsmoduler? Forklar gerne hvordan du tænker om det?

Hvilke forestillinger forventer du de studerende har omkring aktiviteten?

Afslutningsvis:

Vil du kort kunne nævne 3 ting du fandt positivt ved at inddrage aktiviteten?

Vil du kort kunne nævne 3 ting du fandt problematisk ved at inddrage aktiviteten?

Case 3

Noter til spørgsmål i forhold til interview med underviser i case 3

Indledningsvist vil jeg gerne have dig til at give en præsentation af hvad den eller de forskellige aktiviteter bestod i, som du har valgt at inddrage i det modul du har undervist.

På hvilken måde levede aktiviteten op til de forventninger du havde inden?

- hvad tænker du om de studerendes indsats i forhold til at inddrage aktiviteten?

- oplevede du aktiviteten supplerede de studerende?

På hvilken måde levede aktiviteten ikke op til de forventninger du havde inden?

Hvordan/på hvilken måde tænker du at disse aktiviteter (både de i lektionerne og de afsluttende i det psykologiske værksted) lægger sig op ad den PBL tilgang som kendetegner AAU?

Hvad tænker du at du som underviser har fået ud af at inddrage denne aktivitet i din undervisning/værkstedet?

Hvilke overvejelser gør du dig i forhold til evt. at skulle inddrage aktiviteten igen næste gang i samme undervisningsmodul? Overvejer du at inddrage aktiviteten eller elementer af aktiviteten i andre undervisningsmoduler? Forklar gerne hvordan du tænker om det?
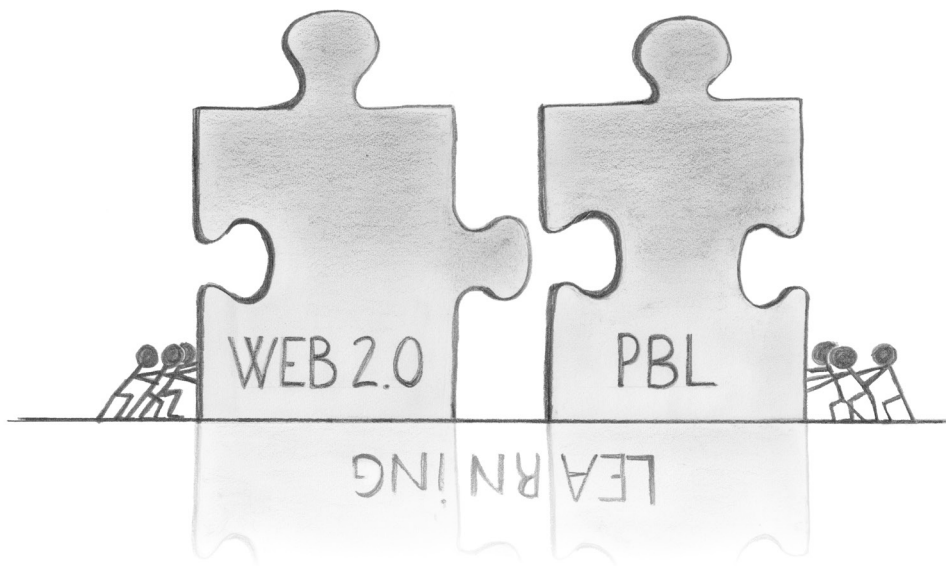
Hvilke forestillinger forventer du de studerende har omkring aktiviteten?

Afslutningsvis:

Vil du kort kunne nævne 3 ting du fandt positivt ved at inddrage aktiviteten?

Vil du kort kunne nævne 3 ting du fandt problematisk ved at inddrage aktiviteten?

SUMMARY

This PhD dissertation uses action research to study how teacher can integrate Web 2.0 and social media in their teaching practice by designing Web 2.0-mediated learning activities, and furthermore study how to scaffold this kind of technology integration.

The ideology of Web 2.0 provides research opportunities to study phenomena such as collaboration, active students and user participation, and combined with PBL and networked learning terms like student-centred (user-generated) content, active participation (creating), interaction (group work), engaging in (social) networks and sharing of knowledge can be added.

The research identifies different learning potentials when designing for Web 2.0-mediated learning activities, but it also show challenges and tensions that needs awareness.

Another outcome from this research is a learning design methodology for scaffolding teachers when they design and integrate Web 2.0-mediated learning activities. The learning design methodology builds on an existing collaborative e-learning design method (CoED).

The research in this PhD dissertation is inspired from the authors work in the e-Learning Cooperative Unit (ELSA) as e-learning consultant and her involvement in an international European Union (EU) project in collaboration with colleagues from the e-Leaning Lab – Center for User Driven Innovation, Learning and Design (eLL).