Integration of Video Podcast

In e-Learning

A report on Integration of technology in a learning institution

by

Johanne Thejl Jensen

Miklós Hermesz

Supervisor: Kathrin Otrel-Cass

Aalborg University

Faculty of Engineering and Science, Aalborg

Techno-Anthropology Master's programme

10th semester

8th of June 2016

Academic year 2015/2016

1

Titel:	**Integration of Video Podcast in e-Learning**
Semester:	**10th semester**
Semester tema:	**Master Thesis**
Projektperiode:	**1st of February – 8th of June**
ECTS:	**30 ECTS**
Vejleder:	**Kathrin Otrel-Cass**
Projektgruppe:	**1**

_____

Navn: Miklós Hermesz

Studie nr: 20142890

_____

Navn: Johanne Thejl Jensen

Studie nr: 20111270

ABSTRACT

The abstract is enclosed in the report in danish.

Oplag:	- 1
Antal sider:	- 155.104
Appendiks:	- 0
Bilag:	- 0

Ved at underskrive dette dokument bekræfter hvert enkelt gruppemedlem, at alle har deltaget ligeligt i projektarbejdet, og at alle er kollektivt ansvarlige for rapportens indhold. Endvidere hæfter alle gruppemedlemmer for at plagiering ikke forefindes i rapporten.

1

Content

Acknowledgement

The researchers would like to take the opportunity to thank the people who provided assistance during the field work and who gave the researchers' indispensable information and knowledge regarding the investigation.

We would like to thank our supervisor Kathrin Otrel-Cass who gave her guidance and essential help for the semester and the academic report.

Also thanks to Ann Lilith Kongsbak Rasmussen from UCN who not only organized the researchers' investigation at UCN, but provided constructive first-hand information about the newly introduced Video Podcast and the e-Learning system at UCN.

We would also like to thank the teachers and students who have been involved in the Energy Management E-Learning course. They helped the research and gave great support and insights to the investigation on the e-Learning programme and Video Podcast.

Glossary of terms

- **UCN**: Acronym for University College Nordjylland. A tertiary educational institution located in Aalborg. In English, University College of Northern Denmark. UCN has different locations in Aalborg. The location concerning this report is Technology and Business Studies' campus at Sofiendalsvej, 9200 Aalborg.
- **Video Podcast**: The main technology and focus of the investigation. A newly introduced technology for e-Learning purposes. In this report Video Podcast is: Teachers recording podcast, which is an animated recording of their PowerPoint presentation. This means a Power Point with a voiceover, to describe the presented material. The Video Podcast later will be uploaded into UCN's e-Learning platform, called Canvas.
- **e-Learning**: Learning conducted with the help of 'electronic education technology' such as electronic media and tools like internet or computers. Usually this form of education is also distance learning, where students are not located into an educational institution collectively.
- **Energi & Miljø**: This is the department the Energy Management e-Learning class belongs to. The department focuses on studies related to energy technology, its use and implementation.
- **Energy Management (e-Learning):** In Danish it is called Energi management. The students are studying outside the University and College, they are only having lectures at the institution three times three days during the semester. The first and only online Top-Up programme of UCN. Students attending the Energy Management e-Learning programme are studying outside the buildings of UCN, they are only required to attend physical classes at UCN nine days.
- **Academy Profession degree (AP degree):** AP degree is an undergraduate degree which duration is 2-2.5 years and the programme is focusing on an education which is similar as the first two years of a Bachelor education. A flexible, internationally recognized education in Denmark.
- **Top-Up programme**: Top-Up programmes are educations at UCN, which duration is 1.5 years, usually initiated after getting an AP degree. With this Top-Up education, and the previous AP degree, students can get a Bachelor degree. At the time of the investigation UCN provide Top-Up programmes leading to BA degree in seven programmes, with the possibility to study those in English.
- **Regular Education**: In the report the researchers had to distinguish the e-Learning students from other students. The non-e-Learning students, who are present at UCN on daily basis,

belongs to the Regular Education. In the report more terms will be used for the students participating in Regular Education, such as 'face-to-face' or 'non-e-Learning' students. These terms are borrowed from the teachers at UCN.

- **LMS systems**: An acronym for Learning Management System. A complex software which performs many different tasks, such as administration, communication, tracking, documentation, reporting or providing e-Learning courses, lectures or programs. At UCN the current LMS system is called Canvas.
- **ICT**: Stands for Information and Communication Technology. An expanded term for Information Technology (IT), which focuses on the integration of different technological communication tools, such as computers, telephones, audio-visual systems, software and other hardware. The intention is to unify different types of communications, such as audio, video and web conferencing, SMS, e-mail, fax and many more.
- **Canvas**: Canvas is the main learning management system (LMS) of UCN. This is the online interface for the teachers and students at UCN. Both regular and e-Learning students are using this interface to check classes, exam periods, chat, and discussion forums. E-Learning students at UCN also have whole lectures, take quizzes, watch the Video Podcast recordings or do online tests.
- **SmartBoard**: An electronic blackboard. Usually touch based operation is possible. Besides the usual blackboard experience (writing, drawing, erasing) it also providing computer application integrity and Microsoft Windows applications.
- **eBeam**: An electronic pen connected to a Smart Board via wireless technology. Size, and colour of the pen can be adjusted easily and with this tool teachers can interact better with the students through e-Learning.
- **Office Mix**: This is an add-on software from Microsoft which helps the integrity between PowerPoint presentations and SmartBoards and voice recordings. The software helps the teachers to use their own PowerPoint presentations and add animations, drawings and voice at the SmartBoard.
- **Adobe Connect**: A software from Adobe, which is helping to initiate online discussions between two or more people through Video Conferencing. The users can see each other and hear each other's voices. This is one way for the students to communicate with each other or the teachers.
- **Integration**: Integration is the term used for a technology becoming a part of a social network.

Introduction

This research has been conducted by two Techno-Anthropology students, Johanne Thejl Jensen and Miklós Hermesz, who are studying at Aalborg University. This report sums up the investigation conducted in the 10th semester of the Techno-Anthropology M.Sc. programme. This final semester is dedicated to independently initiate and conduct a professional anthropological research study in collaboration with an institutional stakeholder.

The study was conducted in collaboration with University College Nordjylland (UCN). University College of Northern Denmark or in Danish, University College Nordjylland, is placed in Aalborg. The researchers were working together with the employees of the UCN in the campus located at Sofiendalsvej. The two researchers were placed in the main office of the teachers and the research has been focusing on the connection between a newly utilized technology, the Video Podcast and the teachers working with it.

This report is going to describe the nature of implementing the Video Podcast technology in e-Learning. The literature on the issues; the data that has been collected and the findings which arose during the 10th semester project will be presented. The focus will be on the use of the newly introduced technology at the University College Nordjylland, the Video Podcast and its use and integration in UCN's e-Learning initiative. The investigation has a focus on the Energy Management e-Learning course, which is currently the only top-up e-Learning class at UCN. The general idea is that teachers at the Energy Management class use Video Podcasts as a new teaching technology in order to give knowledge in an effective way for the students, enrolled in the e-Learning Energy Management class.

The report has a focus on the Activity Theory introduced by Bonnie A. Nardi. The researchers identified relationships between technology and its organizational, social and cultural assumptions and implications at UCN. These interconnections has been analysed and evaluated with the help of Activity Theory, mainly based on the work of Bonnie A. Nardi, Victor Kaptelinin and Yrjö Engeström Furthermore, Technological Pedagogical Content Knowledge theory will be applied in the discussion and these reflections are made with considering the cultural aspect, because this aspect is closely connected to the researchers' point of view from the field of Techno-Anthropology. The report will offer and present a conclusion, based on the findings; the analytical frameworks applied to analyse the data.

The anthropological study and the ethnographical data collection has been conducted and collected with the help of different scientific qualitative methods, mainly focusing on Participant Observation and Interviews.

This research will contribute to possible future investigations as the use of Video Podcast is a fresh initiative currently at UCN, but they are planning to introduce this technology to other classes and e-Learning programmes as well. The results of the report could be interesting and fruitful to complement and help the future integration and use of Video Podcast in e-Learning.

Report Structure

The first chapter, ***Introduction*** is a general description on how the report is organised and what scientific knowledge will be presented. The ***Literature Review*** will guide the reader further in order to understand the current state of Education Technology, e-Learning and Video Podcast. This chapter will lead toward the researchers' specific ***Problem Formulation*** and ***Research Questions***. The following chapter, is ***Methodology***. *A* chapter that will show the general thinking behind theoretical framework. This chapter will also present the ***Analytical Framework*** in order to describe the scientific starting point of the project. ***Methods*** will describe the chosen methods for collecting empirical data. The **Analysing the *Findings*** chapter, presents the analysis of the collected data. The ***Discussion*** chapter will present the final thoughts on the scientific research and topics of the report. ***Conclusion*** *will present an answer to the problem formulation, and thereby end the report.* .

Timeline

The research started at UCN on the 26th of February and lasted until the 1st of May. Before the 26th of February the authorization of the research and pre-research has been carried out on the topics of e-Learning, Video Podcasts and its current use in study purposes. During the research period the researchers followed a carefully constructed plan to collect relevant data required to construct a quality research. Schedules has been created for each week to follow, which included participations in Video Podcast recordings, lectures when the students attended UCN and interviews, just to mention the most important. After the 1st of May the researchers focused on the coding, interview transcriptions and organizing the collected empirical data to create the scientific report and answer the problem formulation.

Introduction to the field of Teaching and Technology

To facilitate a logical presentation of the integration, use, and impact of Video Podcast at UCN it is necessary to present the current state of technology in learning institutions, the status of e-Learning and Video Podcast. In this chapter the field of teaching and technology, which this project is concerned with, is described. This will be done on the basis of literature that is related to technology and learning institutions, e-Learning, Video Podcast and Technology Pedagogical Content Knowledge. The first part is a description of the field and the second part outlines the difficulties and challenges there can be encountered when introducing new technology in a learning environment.

Technology in learning institutions

Educational Technology is defined as the use of technology in any type and aspect of education institution. Fostering learning, improving quality and performance, by the use of specific technological processes and tools (Ely, 2008).

Educational Technology started to be recognized after the Second World War. The first attempts focused on the communication in the process of teaching and learning with the help of films, filmstrips, recordings and other audio-visual media (Ely, 2008). In the 1960s and 1970s with the introduction and later more extensive use of computers, there was a new possibility for researchers and psychologist to test different theories regarding Educational Technology and to apply cognitive science in education at learning institutions. As many new technological tools were added to the list of existing tools through the years, teaching and education often adapted or changed by the use of the technological tools. New theories and utilization of Educational Technology created new concepts and applications (Ely, 2008).

Educational Technology can be physical tools and it can be theoretic points of view. There are several different aspect of Educational Technology as it is a major field. Technology is in every school, university or college. From the simplest technology such as the abacus from the 20th century, to the high-end digital whiteboard of today. Educational Technology is not exclusively software and hardware, it can be an educational theory, a computer-based training, e-Learning, learning management systems (LMS) or information and communications technology (ICT) just to mention a few (Ely, 2008).

E-Learning and Flexibility

As e-Learning, is broad and far-reaching it is not easy to give a brief definition to describe it. The general consensus on e-Learning states that e-Learning is an educational and teaching concept which uses many kinds of electronic technology to facilitate, aid, lecture and add to the development of

knowledge (Clark & Mayer, 2011) Students enrolled in e-Learning has a greater responsibility towards their own learning experience, as the learning process is usually happening individually and away from the teaching institutions or the teachers (Garrison, 2011).

One of the major discussions about technology in learning institutions are e-Learning. This rapidly spreading and evolving depiction of technology nowadays is all around the world and spreading continuously (Garrison, 2011). There are many names for it besides e-Learning, but the idea behind it is the same. This report regards e-Learning as learning conducted with the help of educational technology from a distance. This means that the education does not have a day-to-day institution for the students and also that the students have to have a great self-regulative mentality as teachers are not present while the education is happening. E-Learning is opening up for more and more students, many countries and its institutions are integrating e-Learning as a new possibility for students who are not able to attend regular education courses (Garrison, 2011).

Tools of e-Learning

E-Learning is not simply a new technological tool that has little impact on education in primary aspects, but a teaching and educational innovation which can provide abysmal amounts of information (Clark & Mayer, 2011). Teaching mediated through computer technology, for example; online tutorial videos and online courses, is a phenomenon which has been present in the society for more than forty years (Clark & Mayer, 2011). Even though if those trainings were plain text on the computer screen and nothing more, it was an electronic version of teaching an individual how to use computers. As the technology is evolving, new aspects of it, such as audio, animations, visuals, and graphics have started to complement knowledge through the computer screen or speakers (Clark & Mayer, 2011).

With e-Learning there are several specific technological tools which can help effective learning. These tools are constantly evolving as technology is developing. The tools, such as internet, software, hardware, networks, media, are helping students all around the globe to learn and develop. These information transmitter technologies are helping to deliver texts, images, video and audio to the participants of e-learning (Clark & Mayer, 2011). The forms of these tools are really extensive. Digital devices, such as computers, notebooks, smart phones, tablets which are able to support individuals with their learning goals. Internet and Web 2.0 to distribute knowledge around the world, not to mention big search engines, social media or video sharing websites, such as Google, Facebook, Twitter or YouTube just to mention the biggest actors on the market right no. (Clark & Mayer, 2011). E-Learning makes knowledge available at a distance and thus through e-Learning there is potential to

create a flexible learning environment for the students. The flexible learning environment is important because students can access their programme, classes and modules at a time and place which fits their daily routines (Garrison, 2011).

Relevance and use of e-Learning

Studies on the topic of 'Learning in online environment is equally good than learning in face-to-face education' shows, that learning online can be just as efficient as learning in a traditional way, in classrooms, even in some cases slightly better. Studies have shown that it is not the transmitting medium but the instructional method that can affect learning and studying (Clark & Mayer, 2011). This does not mean that every media are equivalent, each of them have positive and less positive attributes. As an example books are inexpensive and portable but confined only to texts and pictures. Tablets, as another example, can provide videos and audio, but are fairly expensive and not the most user friendly media to read books on. Computers are possibly one of the most flexible media sources, which can bring unique engagements into learning; many of these are not feasible outside of the digital environment. One example is, how computers and the internet can offer a multi-level and intercultural communication between different actors on a greater scale than any other possible media (Clark & Mayer, 2011).

Video Podcast

Video Podcast as a technological tool is getting more and more attention as a tool which can provide value and additional learning experience for students from all kind of fields. The definition of podcasts is a recorded broadcast material with video and audio channels, distributed and broadcasted by some kind of media and technological tools. Regarding educational use of podcasting, the description is quite similar; in addition, educational podcasts are providing interactive and quality data for the students who acquire the educational training with the help of broadcasts. Recordings can be published on the Internet, downloaded to computer devices or distributed on handheld devices. There are many benefits for this kind of education as its providing creative learning with easy accessibility, the videos can be archived and used later as well (Evans, 2008). Based on Howard Harris and Sungmin Park's researches and investigations, the use of educational podcasting can be categorized in four groups by characteristics (Harris & Park, 2007).

The first category is Teaching-Driven podcasting. In this category podcasting is an innovative educational tool which can improve learning experience and add quality to teaching. Educational podcast can create a relationship between teachers and students where communication is continuous, mutual and fruitful (Harris & Park, 2007). This Educational Podcast can further be distributed into 'lecture podcast' and 'supplementary podcast'. Lecture podcasts are

recorded, full educational lectures and supplementary podcasts are materials which's role is to help and support education connected to a core education (Copley, 2007).

The second category is Service-driven podcasting which is about information gathering, interaction and a communication between the parties. Podcasting here is a more private communication and a service driven content collection. (For example library tours.) (Harris & Park, 2007).

Marketing-driven podcasting is the third category, where podcasting is a tool for recruiting students. There is an increasing competition between tertiary institutions for students and podcasting can be used to market purposes. (For example research works or university news in podcast form.) (Harris & Park, 2007).

The last category is the Technology-driven podcasting where podcasting is a supporting teaching method to spread knowledge about technology amongst other teachers for example. Media support departments and technology departments can utilize these types of podcasting in order to teach about podcasting technology (Harris & Park, 2007).

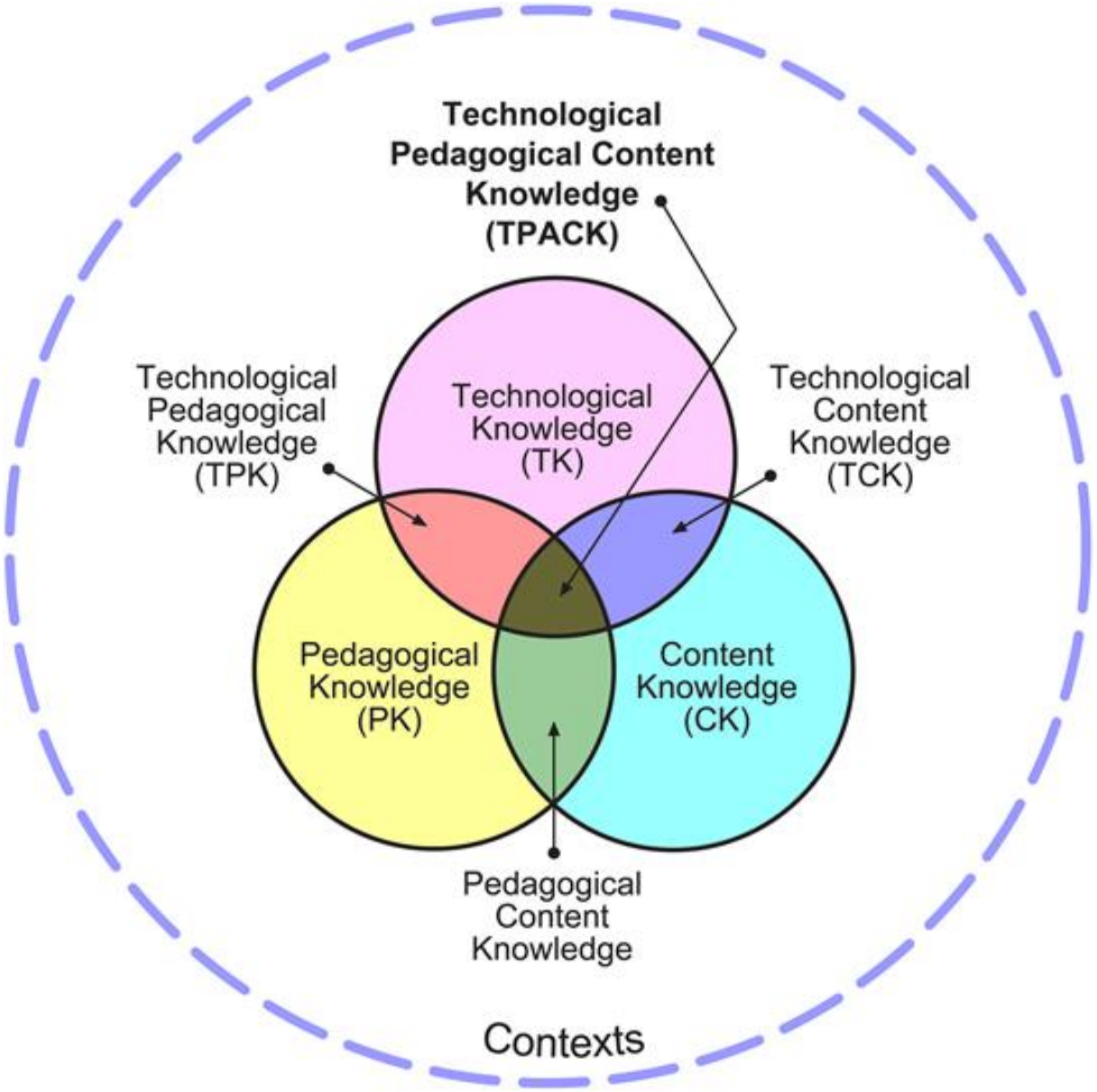
This research and report has been focused on the Teaching-driven podcasting. Using podcasts for learning has its challenge, because some of the traditional aspects of teaching cannot be applied through the two dimensional podcast or that students cannot ask for help instantly if the content is not clear for them, but these specific characteristic of the podcast education and its challenges will be defined more in the following sections.

Challenges when introducing new technology

When introducing new technology there are several aspects to consider. It is not only the technology itself that is important to consider, it is also important to look at the context in which the technology is being introduced. An especially important aspect is the subjects who are a part of the implementation process. Most of the discussions are about how students perceive technology in their education, but technology is affecting teachers similar as it is affecting students. Technology shapes the interactions of both groups (Angeli & Valanides, 2015). It is important that teachers understand and utilize the technology proper in order to give quality knowledge. To describe the connections between teachers and technology, Technological Pedagogical Content Knowledge (TPCK) is a valuable theory. A research field which is focusing on what types of knowledge is required to integrate technology effectively in education and teaching. TPCK has an emphasis on three different kinds of knowledge; Technological knowledge (T), Pedagogical knowledge (P) and Content knowledge (C). These three types of knowledge should work together and be present equally in a teacher in order to give knowledge and use technology effectively. (Angeli & Valanides, 2015).

When integrating new technology in a practice, there has been a focus on the technology itself and which impact it has on the field, and how it can be applied. But often there has not been enough focus on the development of the Pedagogical Knowledge. There has been a lack of developing that support and match the technology that are being integrated so that the transformative nature of the technology can be utilized (Angeli & Valanides, 2015). Pedagogical Knowledge is important because it makes it easier to describe how technology is applied in teaching and learning (Angeli & Valanides, 2015).

For teachers to be able to teach with new technologies it is not enough that teachers have an excessive amount of Content Knowledge it is necessary for the teachers to have Pedagogical Knowledge and to use the intersectional knowledge of Content Knowledge and Pedagogical Knowledge (see 1. Figure, page 16). This knowledge helps the teacher to transform the subject matter, so it can be understood by a classroom full of students with diverse background knowledge. When introducing new technologies, the two kinds of knowledge; Content Knowledge and Pedagogical Knowledge is not enough. A third kind of knowledge is needed; Technological Knowledge (see 1. Figure, at page 16). This integration of knowledge relies on all three kinds of knowledges; T,P, and C, and is a *"[…]dynamic construct that describes the knowledge teachers rely on when designing and implementing curriculum and instruction while guiding their students' thinking an learning with digital technologies in their specific content areas"* (Angeli & Valanides, 2015).



1. *Figure: (http://tpack.org 2012) Technological Pedagogical Content Knowledge circle. Reproduced by permission of the publisher, © 2016 by tpack.org*

In 'Technological Pedagogical Content Knowledge' by Charoula Angeli and Nicos Valanides (Angeli & Valanides, 2015) it is suggested that true transformational learning is infrequent even though technology has gone through huge development the last century and; *"[…] technology has not disrupted teaching practices and pedagogical decisions enough to make an impact"* (Angeli & Valanides, 2015).

Various authors have shared their ideas and opinions on the growth of e-Learning. It had been described as a revolution in higher education; a unique and new way of education and training (Garrison, 2011). However as the field of e-Learning is still exploratory, changing and extending, the knowledge on the topic is continuously generated. The requirement for in-depth and profound re-

search is apparent as e-Learning raises the question: if this type of education is enhancing the existing teaching practices or is e-Learning a potential way to transform education fundamentally (Garrison, 2011).

The above mentioned descriptions and theories together provides an understanding on the current situation of technology integration and its transformative nature in educational institutions. This leads to the following problem formulation.

Problem formulation

As Educational Technology is constantly improving, educational institutions are aiming to keep up with competition and integrate new and valuable technological concepts and tools. One of these new technological concept is e-Learning, a growing form of education. UCN's main objective is to implement online teaching in their education. Video Podcast is a valuable new technological tool at UCN, with the claim to enhance and create better e-Learning. The integration of the technology is primarily affecting the teachers' daily life as they are interacting first hand with the podcasts. Students have learning objectives which are guidelines for the teachers who are providing the education. In order to investigate if this technological tool is facilitating better e-Learning or not, and to see if the technology is helping the teachers' learning objectives or not, the researchers created the following problem formulation to aid their scientific research:

Problem formulation:

> **What is the nature of integrating Video Podcast in e-Learning education, and how does the technology affects the teachers' ability to achieve their learning objectives?**

Research questions

In order to answer the problem formulation the following research questions has been created. The research questions are focusing on the upcoming challenges connected to e-Learning and Video Podcast, the social structure and connection between the different actors.

- Which technological tools are available in relation to e-Learning and the Video Podcast, to reach the teachers' desired objectives?
- How does the video podcast correspond to the 'creation of learning'?
- What are the challenges connected to e-Learning and Video Podcast from the teachers' perspective?
- What is the structure of social interactions surrounding e-Learning?
- How does the students perceive the e-Learning education and the Video Podcast and what are their experiences with the educational concept and technological tool?

Methodology

The Methodology chapter will describe the overall theoretical framework guiding the remaining parts of the report. In the first section a brief introduction of Activity Theory, as the main theory will be presented. After the introduction the main analytical tools used to frame the analysis are described. Firstly the Activity System Model will described with a focus on the key concepts of Activity Theory and illustrating the concepts of an Activity System Model. Secondly the six basic principles of Activity Theory will be introduced, after this the Activity Checklist will be presented as it has roots in the six basic principles. The end of the chapter will reflect on the limitations of Activity Theory and give perspectives on how Activity Theory can be complemented by the field of Techno Anthropology.

Introduction to Activity Theory

In the following section a basic introduction to Activity Theory will be presented. A historical context in which the ideas were founded and the main concerns of the theory will be described to give insight to how the theory developed.

Activity Theory emerged from the notions of Marx from the 19th century, that the matrix for the development of human behaviour is represented in work. It was the thinking of Vygotsky about cultural-historical psychology Luria and Leont'ev, by adding the notion of activity and action, which has played a big part of the development of Activity Theory in Western Europe (Kaptelinin & Nardi, 2006). Activity Theory supposes that a specific human psychology is defined by a behaviour that is goal oriented (Engeström, 1987).

Activity Theory has a focus on studying human practices. Bonnie A. Nardi works especially with the practice of human-computer interaction (Nardi, 1996). It is a theory which seeks to explore and understand the relationship between consciousness and action (Nardi, 1996, pp. xi-xiii). Consciousness is described as being located in people's everyday practices. Though it is called Activity Theory it must be understood that activity theory is a practical approach to investigate practices and should be applied as a *"[…] clarifying descriptive tool rather than a strongly predictive theory"* (Nardi, 1996, p. 7). What Activity Theory can provide is a set of tools for understanding *context*, *situation* and *practice*; it provides a set of concepts for describing human activities (Nardi, 1996). In the present project Activity Theory has been applied as a tool to structure the investigation and to assimilate and analyse the field of investigation. It has been applied as a tool to assimilate the meditation going on in the process of e-Learning and the use of Video Podcast. It is well suited for the investigation of Video Podcast because more than being concerned with human-computer interaction, Activity Theory has a focus on the relationship between people and things (Nardi, 1996). The theory is concerned with the knowledge the field possesses, which can often be tacit and embedded in the people's practices (Nardi, 1996). This is why it can be interesting to investigate user perspective of Video Podcast because Activity Theory builds on the notion that users can be designers as well as users, because there is a constructive relationship between users and systems (Kuutii, 1996). Activity Theory is *[…] a philosophical and cross-disciplinary framework for studying different forms of human practices as development processes, with both individual and social levels interlinked at the same time"* (Kuutii, 1996, p. 25).

Main Concerns of Activity Theory

An activity is the process of how a subject reach a certain goal. There are three major concerns of the Activity Theory: consciousness, relation between people and things and the role of artefacts in people's everyday life. These concerns are important to note to be able to understand the interconnectedness Activity Theory is concerned with.

Consciousness

In Activity Theory the concept of consciousness is central to a portrayal of activity. Consciousness is an important phenomenon when one is dealing with for example users or system design to stay close to the research area. An activity cannot be truly understood without asking the user to understand the intentions and the general consciousness behind a specific activity. Consciousness is also important in connection with design. As an example one can say, a system is designed well if the technology and its use is "transparent". A good interface does not use a lot of the user's attention, the technology should be supportive and unassertive (Nardi, 1996).

The relationship between people and things

Activity Theory distinguishes between people and things. Activity Theory argues that there is an asymmetrical relationship between people and things. People are the ones with capacity of motive and consciousness whereas things are *"[…] mediators of human thought and behaviour; they do not occupy the same ontological space"* (Nardi, 1996, p. 13). This asymmetrical relationship and the emphasis on the differences between people and things does not mean that one is more important than the other. The social matrix is constructed by the people plus artefacts, so the two are positioned equally while jointly building the social matrix. To be able to understand activities, different concepts must be studied and understood. It is especially important to investigate how concepts are integrated into the social practice to understand the activities surrounding it. This is important because mind and body are *"[…] profoundly extended and transformed by artefacts"* (Nardi, 1996, p. 14).

Role of Artefacts

The third important perspective is about the importance of the role of artefacts. Artefacts are special mediators of human thoughts and behaviour. Activities cannot be understood without first understanding the role of the artefact in everyday life. The social matrix equals people plus things (Nardi, 1996). As this statement by Nardi is significant to the second concern, it is significant for the third as well. Artefacts in people's everyday life are helping them to express their feelings, desires and emotions. While the artefacts are also major participants besides humans when one is talking about building the social matrix (Nardi, 1996, pp. 14-15). In this report artefacts and tools are regarded as the same concept. Therefore tools will be used as the word to describe this in the rest of the report.

Analytical Framework for Analysis

In the following section two main analytical tools applied in the analysis are described. First the Activity System Model (Engeström, 1987) *will be introduced. The model has been included because it can establish a manageable and concise overview of an activity system. The model will later in this report be applied to illustrate examples of concepts within Activity Systems encountered when looking at e-Learning at UCN. The second part presents the Activity Checklist. This will be the main analytical tool in the analysis and this tool will help guide and structure the 'Analysis of Findings' chapter in this report.*

By building on Engeström, who works mainly with organizations, the focus is not only on individual actions but also collective activity. With the use of the triangle as an illustration of the concepts connected to the Activity System Model (see 3. Figure, page 23) it is possible to describe the situation; one just has to remember that it is a static illustration of an activity (see 3. Figure, page 23).

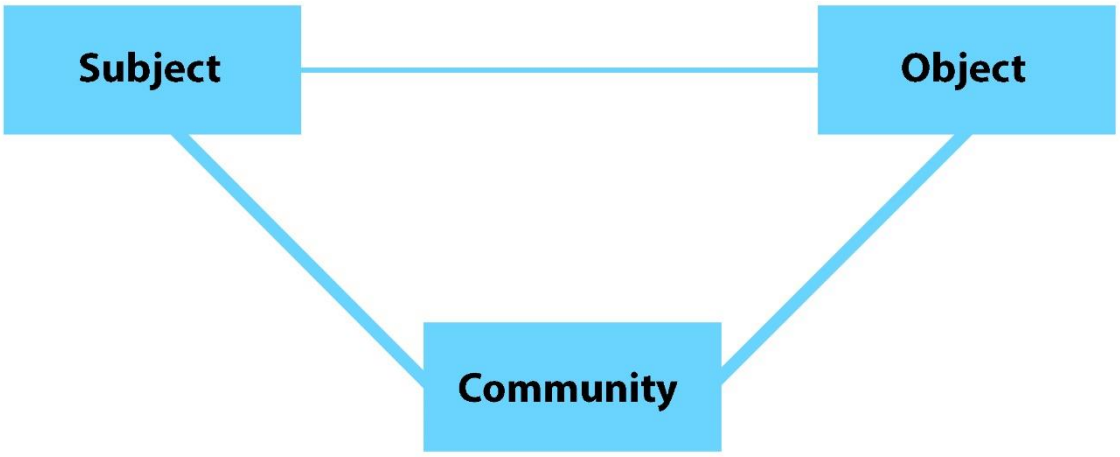
Activity System Model

Activity Theory enables the investigation of activities from the perspective of a specific subject. By adding the Activity System Model illustrated by a triangle, it is possible to describe the concepts which affect the use of the Video Podcast, and how the concepts are connected in an Activity System.

Engeström redefined in 1987 the conceptual system of actions (Engeström, 1987), theorised by Leont'ev in 1981. While Leont'ev was more concerned on the activities of individual beings, even though he mentioned that activities can be executed by groups, team or other social entities, he did not explore and create a system for investigating the structure and function of common activities performed by social entities (Kaptelinin & Nardi, 2006).

The Activity System Model introduced in this section is the one evolved by Engeström in 1987. This triangle is based on Leont'ev's original work but it added two extra connections to the already existed subject-object interplay (Engeström, 1987). The Activity System Model is applied to describe the components of an activity and show certain activities but it has its limitations as it is only focused on a moment in time, therefore it cannot describe the ongoing nature of an activity. The model takes into account that there is, or can be, a history of development through community, rules and division of labour. What can be argued is that the model is missing the ongoing learning processes which occur when the subject interacts with the tool in the pursuit of the desired object (Bellamy, 1996).

Engeström introduced a third concept to the relationship between subject and object in an activity system. This addition called community, created a three way interrelationship between subject, object and community (Engeström, 1987) (See 2. figure below.).



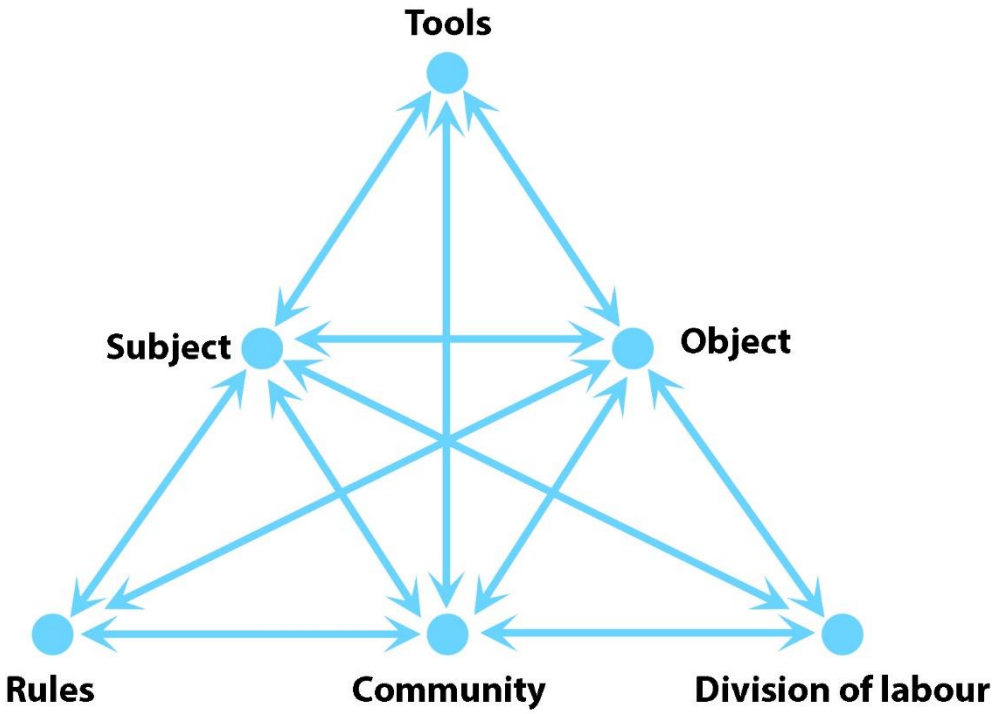
2. Figure Three concept relationship between Subject, Object and Communit. Illustration inspired by Yrjö Engeström's concepts of Activity System Model (Yrjö Engeström 1987).

Secondly Engeström (1987) introduced the idea of special mediation modes of the three interactive concepts, which are: Tools or instruments (subject-object interaction), Rules (subject-community) and Division of labour (community-object interaction).

These concepts here are outlined by Kari Kuutti, because they are especially significant for applying Activity Theory as an analytical tool, and because these are the mediating factors between subject, community and object:

- Tools: *"[…] can be anything used in the transformation process, including both material tools and tools for thinking"*.
- Rules: *"[…] both explicit and implicit norms, conventions, and social relations within a community"*.
- Division of labour: *"[…] the explicit and implicit organization of a community as related to the transformation process of the object into the outcome"* (Kuutii, 1996) P. 28.

The connection between three concepts; subject, object and community and the three concepts; rules, tools and division of labour is illustrated by figure 5 below.



3. Figure Illustration about the relations of concepts, inspired by Yrjö Engeström's concepts of Activity System Model

Activity is a key word when working with Activity Theory. An activity is an action performed by a person in a social context (Kuutii, 1996). When trying to understand an activity it is often important to consider the history of the activity, because activities are not static and it is developing continuously. Also, tools have history and have been developed through the development of activities, because a tool has a mediating role between people and objects. A tool can be used by humans to control their behaviour (Kuutii, 1996). Object is also a keyword. An object can be both a material thing or it can be a common idea, the premises for the object is that it can be affected and transformed by the participants of the activity (Kuutii, 1996).

The structure and relations

An important part of Activity Theory is not only the key concepts but the structure of these elements. Activities are always directed towards an object; therefore the object is the motivational factor for any activity preformed. The relationship and processes are ever developing and therefore it is possible that the object and the motive can change during the activity (Kuutii, 1996). As it is a developing process it is important to beware of the historical development of subject and object. So it is important to see the activities in a historical context. It is also important to look at the community surrounding the activity, because the activities are never just a separate things between subject and object. Activities will always be affected by the community in which the relationship is formed. Therefore the subject-community and community-object relationships must be considered (Kuutii, 1996).

Taking a closer look at the relationships constituting the structure of the elements, it is clear that tools are mediating factors for the relationship between subject and object, and tools, can enable and/or restrict the object. If attention is then given to the relationship between community, subject and object, it is essential to know that rules are the mediating factors between subject and community and division of labour is the mediating factor between community and object (Kuutii, 1996).

Contradictions of the Activity System

This Activity System can best be illustrated by the triangle model, but it is important to know that the triangle describes an activity in a point in time. One basic statement of Engeström (1987) is that the Activity Systems are constantly changing and developing. These developments can be reached by realizing four types of contradictions according to Engeström (1987), which are:

- Inner contradictions are the contradictions of each concepts. These contradictions are independent from the other concepts.
- Second types of contradictions are the contradictions occurring between the concepts of the Activity System.
- The third contradiction is focusing on the problems between the existing forms of an Activity System and its advanced object. The top hierarchy Activity Systems can be undermined by the resistance to change or the lack of motivation.
- The last contradiction is about the network of the Activity Systems. This contradiction is emerging between two or more network of Activity Systems

In the chapter “Findings” the activity system model, represented by the triangle, is applied to characterize the different concepts found at UCN and to make it clear to the reader how they are connected before moving on to applying Activity Checklist as a structure, and explanatory analysis of the findings. In the following sections the six basic principles of Activity Theory will be described and the Activity Checklist will be introduced.

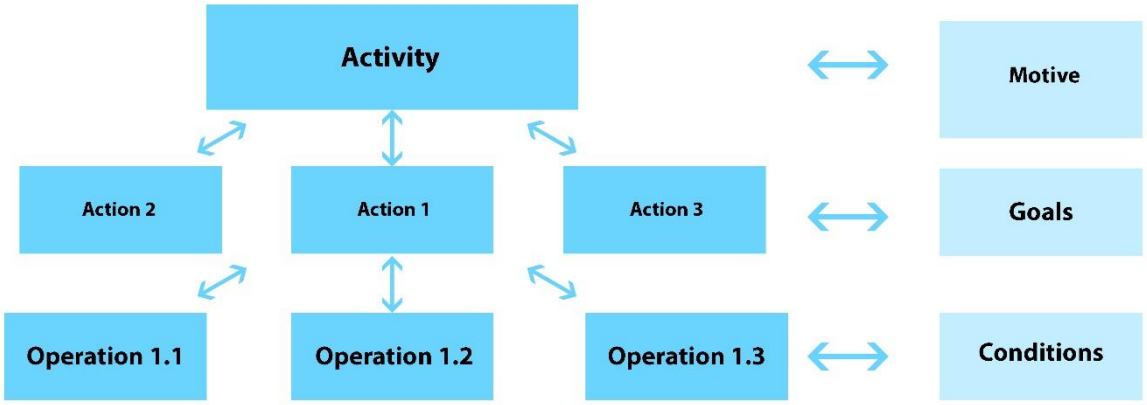
The six basic principles of Activity Theory

Activity Theory consists of six main principles. While the principles standalone they are all interrelated and contribute to understanding human activity (Kaptelinin, 1996, p. 110).

Working with Activity Theory requires an attention to context, because the basic principle of Activity Theory is the unity of consciousness and activity. Context is where the activity takes place. Activity refers to the human interaction with the environment, and thereby also where consciousness exists. Consciousness is described as the human mind emerging as a component of human interaction with the environment (Kaptelinin, 1996).

There are two other principles of Activity Theory; object-orientedness and the hierarchical structure of activity. Object-orientedness refers to *"[…] the environment with which human beings are interacting"* (Kaptelinin, 1996, p. 107). The environment consists of different entities such as social-, cultural- and physical entities and these affect how humans act in the environment in which they are interacting (Kaptelinin, 1996).

In Activity Theory there is also a focus on a distinction between levels of processes (see 4. Figure, page 25). This is the basic of the hierarchical structure of activities principles. The distinction is made between activities, actions and operations. This distinction is made because it is important to consider whether people's behaviour is oriented to a motive, a goal, or actual conditions. Here it is important to see if the object that the process is oriented towards is the goal itself or it is something that needs to be achieved to reach something else (Kaptelinin, 1996).



4. Figure Hierarchy level of an activity. Illustration inspired by Kari Kuutti's A framework for HCI Research

The next principle is internalization and externalization, which is about how humans acquire new abilities. The internalization is the actions that can be conducted when knowledge goes *"[…] from* inter-subjective *mental actions to* intra-subjective *ones"* (Kaptelinin, 1996, p. 109). Externalization is mental processes expressed by actions conducted by a person (Kaptelinin, 1996).

Mediation is also an important principle of Activity Theory. It is argued that *"Tools are thus the carriers of cultural knowledge and social experience. Tool mediation is no less an important source of socialization than formal education"* (Kaptelinin, 1996, p. 109). Tools are mediators of human activity and they affect people's behaviour through internalization (Kaptelinin, 1996).

"To understand a phenomenon means to know how it developed into its existing form" (Kaptelinin, 1996, p. 109), this quote about development shows the importance of knowing the history of a phenomenon to understand how it has become what it is (Kaptelinin, 1996).

As mentioned it is the Activity Checklist which is the main frame for this analysis. Bonnie A. Nardi (1996) works within the field of human-computer interaction and the Activity Checklist contains the major ideas and elements from Activity Theory, but opposite to the Activity System Model introduced by Engeström (1987), it lets the writer work and describe in a more non-static way.

Activity Checklist

For structuring the analysis of empirical data Activity Theory has an analytical tool which can help the researchers to coordinate, structure and categorize findings. This tool is the Activity Checklist which gives importance to recognize and distinguish different attributes, actors and features of the field. The activity checklist relies on four pillars which are the mainframe for the analysis. The four pillars; means and ends, environment, internalization and externalization, and development will be presented and described in this section. Two figures will be presented which depicts the pillars and what knowledge is related to each pillar. One figure is connected to the evaluation usage of the checklist (see 5. Figure, page 27), the second is a consisting a set of questions organized by the four pillars (see 6. Figure, page 31).

EVALUATION VERSION				
	Means/ends	**Environment**	**Learning/cognition/ articulation**	**Development**
	People who use the target technology Goals and subgoals of the target actions (target goals) Criteria for success or failure of achieving target goals Decomposition of target goals into subgoals Setting of target goals and subgoals Potential conflicts between target goals Potential conflicts between target goals and goals associated with other technologies and activities Resolution of conflicts between various goals Integration of individual target actions and other actions into higher-level actions Constraints imposed by higher-level goals on the choice and use of target technology Alternative ways to attain target goals through lower-level goals. Troubleshooting strategies and techniques Support of mutual transformations between actions and operations	Role of target technology in producing the outcomes of target actions Tools, other than target technology, available to users Integration of target technology with other tools Access to tools and materials necessary to perform target actions Tools and materials shared between several users Spatial layout and temporal organization of the working environment. Division of labor, including synchronous and asynchronous distribution of work between different locations Rules, norms, and procedures regulating social interactions and coordination related to the use of target technology	Components of target actions that are to be internalized Knowledge about target technology that resides in the environment and the way this knowledge is distributed and accessed Time and effort necessary to master new operations Self-monitoring and reflection through externalization Use of target technology for simulating target actions before their actual implementation Support of problem articulation and help request in case of breakdowns Strategies and procedures of providing help to other users of target technology Coordination of individual and group activities through externalization Use of shared representation to support collaborative work Individual contributions to shared resources of group or organization	Use of target technology at various stages of target action "life cycles"—from goal setting to outcomes Effect of implementation of target technology on the structure of target actions New higher-level goals that became attainable after the technology had been implemented Users' attitudes toward target technology (e.g., resistance) and changes over time Dynamics of potential conflicts between target actions and higher-level goals Anticipated changes in the environment and the level of activity they directly influence (operations, actions, or activities)

5. Figure (Kaptelinin, et al., 1999) Illustration describeing the evaluation version of Activity Checklist.

Means and ends

If one would like to investigate human-technology interaction it is important to identify the desired object of activities. It is required to find the main object and after the object is found, open up the scope of the investigation to activities and actions. Human beings usually have their goals placed in a hierarchical order which shows the desired order of attempts to fulfil these goals. For example in order to get a car ready to travel, it is required to turn on the ignition, put the car in gear and loosen the handbrake (Nardi, 1996). The hierarchical structure of the activity is an important feature as it can show how different activities are nested and it can describe the hierarchy between higher-level and lower-level activities. Usually there is a top activity which includes other relevant activities (Kaptelinin & Nardi, 2006). These sub-activities can have other sub-activities and their own actions (see 6. Figure, page 29).

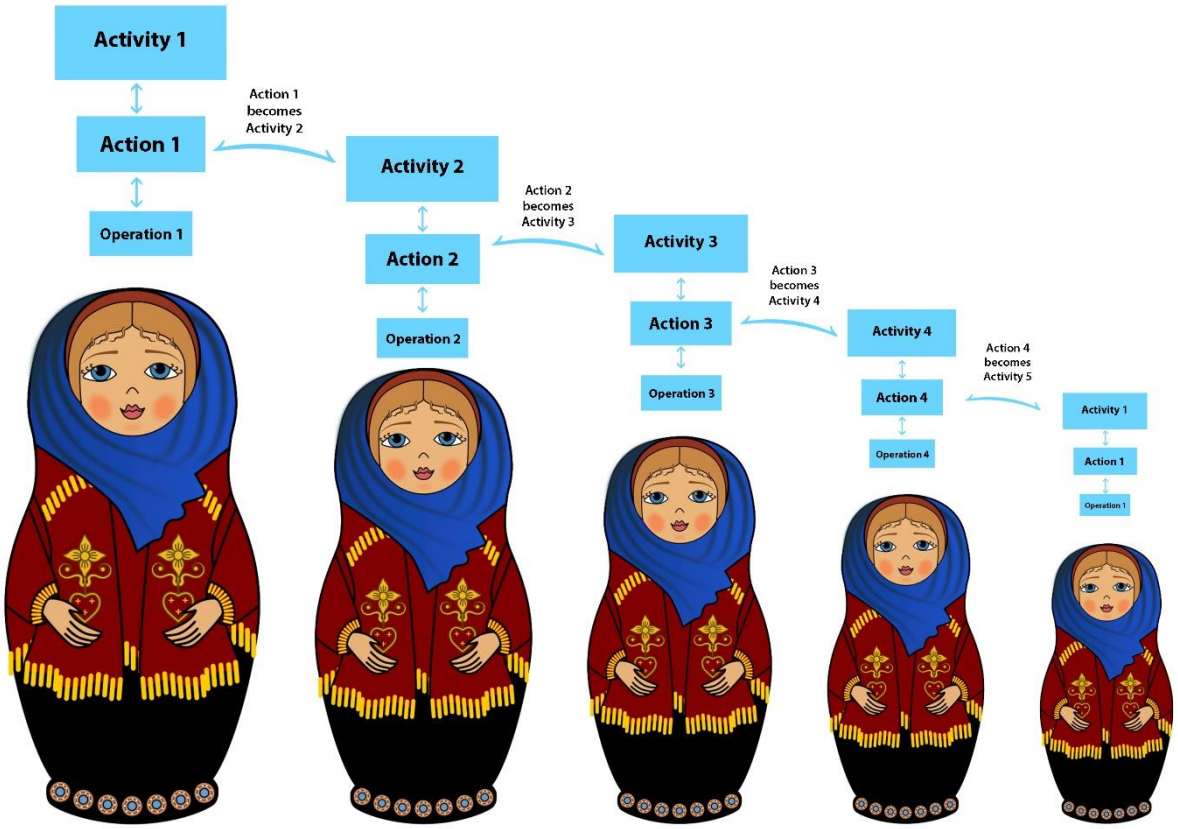
Hierarchical Structure of Activity

There are many activities in the hierarchy system, some of them are higher, some of them are lower level activities, but all activities are the same regarding their components and how the activity is structured (see 4. Figure, page 25). All activities are connected with a motive, which is the motive for the objective. All activities are constructed by actions which are goal oriented. The actions should reach their goals in order to fulfil the desire of the object. Each action is divided in operations. These are the most subconscious happenings which are constructing the actions.

Activities and Actions

As it is described above, activities have their own hierarchy. Actions have the same characteristics. All actions can have sub-goals which divide actions further down. Also activities can be collapsed like the famous matryoshka dolls. An Activity 1's action can be the activity of Activity 2 and the action of Activity 2 can be the activity of Activity 3 and so on (see 6. Figure, page 29). In order to understand this characteristic and relations of activities and actions here is an example:

With the analogy of matryoshka dolls the nesting characteristic can be described. The famous matryoshka dolls are suitable for providing a metaphor to show the resemblance between the Russian wooden dolls and how activities can be collapsed. As the matryoshka dolls are often getting 'younger' from 'elderly woman' to 'baby' as one is going deeper from layer to layer, the actions are also deconstructed into less complex operations each time the hierarchy layer goes down. This happens as the activities are continuously converting into single actions. During this process the actions each time become less complicated. The operations also indicate this as the basic operations as well are getting less complicated each time the hierarchy goes down a level.



6. Figure: Source: (the modified stock image is from jimbongo, openclipart.org 2012)

Illustration describing the nesting characteristic of activities.

Environment

When investigating an activity it is not only important to find the desired objective and the activities connected to it, but it is also important to gain knowledge about the context in which the activity takes place. When describing the environment, objects involved in the activity in focus are identified, because of their importance to the activity and the construction of the environment in which the tool are used to reach a desired goal (Kaptelinin & Nardi, 2006). When describing the environment two main aspects will be presented The Environment- the context and Tools.

The context

It is important to gain insight to the context in which the activity takes place. This means; describing the physical settings where the subjects are engaging in the activity, the social structures surrounding the activities, and division of labour in the activity system (Kaptelinin & Nardi, 2006).

Tools

Describing the environment includes outlining the different tools available for the subjects. The mediating tool of the main activity should be described, because it has a major effect on the execution and fulfilment of the activity. But it is also important to explore the tools available, knowledge about

tools and tools applied in different settings by the subjects of the activity system, because this provides insight about the previous integration of other tools (Kaptelinin & Nardi, 2006).

Internalization and Externalization

Interacting with technology always propose internal actions in connection with different activities. Externalization is the physical attributes of an activity or an action. These are the small gestures which show the internal action is happening. It can be small things, such as using fingers and silently articulating numbers when one is counting something or repeating loud the initial steps of starting the car. These physical attributes usually occur during the beginning of the learning period of a specific action or activity. Internalization is when the external components changes into internal. When there are no more requirements to count and repeat aloud because all the thinking is now more fluent and are happening inside (Kaptelinin & Nardi, 2006).

Group and individual internalization

Internalization can be divided in two forms of internalization; individual internalization and group internalization. Individual internalization is when a subject is using a tool to accomplish a goal and by acting with the tool, the subject is learning and consequently internalizing the use of the tool and the practises connected to it the tool (Bellamy, 1996). Internalization can also happen through the interaction between people, this form of internalization is called group internalization. The group of people rely on social structures, conventions and rules, which become mediating factors for how the group thinks and acts. People in the group share their different knowledge and experiences and in this way gain new knowledge which can then affect the internalization process (Bellamy, 1996).

Development

Activities are always undergoing development which can be either negative or positive. Transformations are occurring as the environment, outside factors and the nature of interaction is always influencing an activity. It is important to investigate the history of the activities, in order to understand the present situation and apprehend the development of the activity. The previously mentioned internalization/externalization is also connected to the development as internalization is one aspect of learning and development (Kaptelinin & Nardi, 2006).

Aspects to consider describing the development is; the subjects' attitude towards the targeted technology, and changes in the environment that can affect the different levels of activity, transformation of previous activities, and subjects' experience at the time of evaluation.

SAMPLE QUESTIONS				
	Means/ends	**Environment**	**Learning/cognition/ articulation**	**Development**
	Are all target actions actually supported? Is there any functionality of the system that is not actually used? If yes, which actions were intended to be supported with this functionality? How do users perform these actions? Are there actions, other than target actions, that are not supported, but users obviously need such support? Are there conflicts between different goals of the user? If yes, what are the current trade-offs and rules or procedures for resolving the conflicts? What are the basic limitations of the current technology? Is it necessary for the user to constantly switch between different actions or activities? If yes, are there "emergency exits" which support painless transition between actions and activities, and, if necessary, returning to previous states, actions, or activities?	Are concepts and vocabulary of the system consistent with the concepts and vocabulary of the domain? Is target technology considered an important part of work activities? Are computer resources necessary to produce a certain outcome integrated with each other? Is target technology integrated with other tools and materials? Are characteristics of target technology consistent with the nature of the environment (e.g., central office work vs. teleworking)?	Is the whole "action lifecycle," from goal setting to the final outcome, taken into account and/or supported? Does the system help to avoid unnecessary learning? Is externally distributed knowledge easily accessible when necessary? Does the system provide representations of user's activities that can help in goal setting and self-evaluation? Does the system provide problem representations in case of breakdowns that can be used to find a solution or formulate a request for help? Are there external representations of the user's activities that can be used by others as clues for coordinating their activities within the framework of group or organization?	What are the consequences of implementing the target technology on target actions? Did expected benefits actually take place? Did users have enough experience with the system at the time of evaluation? Did the system require a large investment of time and effort in learning how to use it? Did the system show increasing or decreasing benefits over the process of its use? Are users' attitudes toward the system becoming more or less positive? Are there negative or positive side-effects associated with the use of the system?

7. Figure (Kaptelinin, et al., 1999) Illustration describing the sample questions of Activity Checklist

Limitations of Activity Theory

There are a few limitations of the theory which is needed to be taking into consideration if one is would like to use Activity Theory. Firstly, the theory, as a psychological tool, is mostly focusing on individual human beings. The social context always plays an important role regarding the theory, but as Activity Theory is mostly focusing on the individual level, Victor Kaptelinin (Kaptelinin, 1996) is arguing that the theory can be applied to a collective subject as efficiently as it can be applied to the individual. Researchers of Activity Theory for example Engeström, (1987) agree that the theory can be applied on 'superindividual units' such as teams, communities, groups or organizations (Nardi, 1996). The activities of a group can be followed and analysed through basic guidelines, such as motives, goals, tools, developmental changes and conditions of the activity. By the same guidelines it is possible to find a common pattern between individuals and investigate interactions between members of a group, community, team who are pursuing common goals. Nonetheless it is important to take into consideration the most important differences between individual activity and collective subject activity, which is that even if the goal is common between the members of the group, community, team

etc., the individual's personal goals are also important factors. These personal beliefs and motivations can differ from the common goals and so, can make it difficult to apply Activity Theory on common group activities the same way as it can be applied to individuals' activities (Nardi, 1996).

Also when working with activity theory it is important to be aware that it may narrow the focus chosen before going into the field, and thereby excluding other perspectives. This is not necessarily a negative thing as it brings focus to the main objective of a research, but it should still be remembered that this evidently excludes the view on other perspectives (Nardi, 1996).

The second limitation is that Activity Theory focuses on a narrow point of view of culture and it is usually applied to specific needs. Activity Theory borrowed a lot of characteristics from natural sciences, so cultures, beliefs, emotions and values of humans are all taking into consideration but not in a comprehensive way (Nardi, 1996). This can be accommodated by applying other perspectives (see section below).

Techno-Anthropology and Activity Theory

The second limitation mentioned in the previous section is describing how the theory focus on some of the aspects of, for example culture, just enough so the human interaction with the world can be understood. The Techno Anthropological expertise can be a valuable addition to Activity Theory as its anthropological aspects are focusing on the human phenomena more in-depth, as Victor Kaptelinin states "*[…] activity theory cannot completely substitute for an anthropology that defines and understands culture"* (Kaptelinin, 1996, p. 64).

Activity Theory and Techno-Anthropology share common ideas and the Techno-Anthropological expertise and research at the current field of study compliments each other. As Activity Theory is focusing on human beings and their activities, it is naturally expected that Activity Theory can benefit from different social studies and investigations of social aspects with for example the use of computers. As only one theory is never sufficient to provide a proper answer and give an absolute solution, Activity Theory is not a magical tool which solves every problem related to individual, group and organizational technology use. However the basic principles of the theory can provide useful ways to study individuals and their interactions with technology (Nardi, 1996).

There are possible solutions suggested to overcome the limitations of Activity Theory by combining different types of approaches. One of the suggestions is to apply contextual approaches, such as ethnography. Ethnography is the comprehensive study of people and cultures. The researcher observe a group, culture or society, while collecting data in order to fulfil the aim of the research. Ethnography

can help investigate everyday environment and practices of individuals and groups, their beliefs, habits, needs and motivations. By that important factors of the subjects' work-life can be taken into consideration. After this initial step a more cognitive approach can be launched where more in-depth and detail specific investigation can be executed (Nardi, 1996). This example of combined investigation is quite similar how Techno-Anthropologists are usually initiating their researches (Botin & Børsen, 2013), so one can see how this theory and the basic principles of Techno-Anthropology can work together. It is mentioned in Context and Consciousness that Activity Theory is a developing approach and it has a great strength in, that it can integrate and work together with other conceptual frameworks and models (Nardi, 1996).

Methods

In this chapter the methods used to collect the data is described. The first part introduces considerations of methods when working with Activity Theory. The second part introduces the methods applied in this investigation, describing examples form the fields to highlight some applications of methods and experiences from the field. In this section participant observation and interviews are introduced as the main qualitative methods applied in this project. Perspectives on different dilemmas accounted in the field, is included to show implications with doing field work.

Method considerations based on Activity Theory

Based on Conscious and Consciousness, Activity Theory does not think interview data is entirely useful in most cases as people, mostly in HCI community, cannot explicate what are they doing or what are their actual tasks. However, Nardi mentions that stating that interview is not a reliable tool regarding Activity Theory, can also be a way to avoid talking to participants or a justification of observational studies only. In this project interviews has been applied as a tool to support data collected through observations and to elaborate on specific subjects arisen during fieldwork. In this project interviews are included as a valid qualitative method because it brings value in form of overall knowledge about certain subjects observed in the field and it can be a starting point for new knowledge about certain subjects (Nardi, 1996).

Observation is a big part of Activity Theory as it is really important that the researcher is able to investigate what are the participants actually doing during their everyday routine and course of activity. It is noted that the researcher should not depend on inflexible plans and goals, but to acclimate and take part in the activity flow (Nardi, 1996, pp. 88-89).

Nardi's practical methodological implications are mostly focusing on HCI studies to show what Activity Theory signifies. As e-Learning is integrally connected to HCI and the researcher's Techno-Anthropology study at UCN closely related to HCI as well, these four major methodological implications can be used on the researcher's current field of study and investigation (Nardi, 1996):

- A research time frame long enough to understand subjects' objects. Activities are usually a longer-term processes and the objects which are connected to these activities are cannot be converted into outcomes in no time, but it often requires numerous steps and diverse design or planning.
- Attention to broad patterns of activity and not just focus on narrowed down sections. It is important to reveal the major patterns and broad schemes in order to reveal the actual situ-

ation. It is necessary to see the big picture. Besides the just mentioned, of course the researcher should also focus on smaller elements but not exclusively. A fine balance is required.

- The use of a varied set of data collection techniques which can be observation, video, audio recordings, interviews or historical materials and many more. It is essential not to depend upon solely one method but use diverse tools to gather the required empirical data.
- A commitment to understand things from subjects' points of view is another main point, as it is necessary to find out what are the natives' point of view on different topics, technology, actions, incidences etc. related to the field of study. Their insights and thoughts are important sources of data. As it is mentioned previously regarding different research tools, the researcher has to be critic on what the subject can provide.

In order to reach a rich and valuable empirical data collection, it is both required to use systematic frameworks and incorporating the whole context where people and technology comes together. Also it is important to have a creative attitude in order to adapt to different changes and actions perceived on the field of study. By reaching a synthesis of this two different ways of thinking, a rational and fruitful investigation can be produced (Nardi, 1996).

Methods applied in the project

This section describes the methods applied in the investigation for gathering data. These are therefore the foundation for the empirical data that are the basis of the analysis in this report and thus conclusion. Participant Observation was conducted, in addition to that, interviews were carried out as a supplement method. These two methods will be described in the following chapter. The investigation relies on qualitative methods which have all played a part in shredding light on the problem formulation; 'What is the nature of integrating Video Podcast in e-Learning education, and how does the technology affects the teachers' ability to achieve their learning objectives?'.

In this section the methods applied in the project are described, it is explained how they were conducted and in which settings they took place. The first part of this section describes how data was collected through participant observation and interviews, and the second part describes different dilemmas in the field.

Participant observation

Participant observation has been exercised in this investigation as one of the main methods to uncover knowledge and gather data. Participant observation is an invaluable tool to understand how the practices of subjects are emerging in a context (Hastrup, 2011), where

they are not necessarily anticipated by the various stakeholders that created the product. Participant observation helps to understand the subject beyond the narrow spectrum of functionalities, why it is a fair method to use in the case of e-learning and video podcast.

Time of fieldwork

The project had a time frame from the 1st of February 2016 to the 8th of June 2016. The time frame for the fieldwork was from the 26th of February to the 1st of May. During this period of time the researchers were part of different activities at UCN and in general the researchers were present at UCN for 3-4 days a week. This meant that there was time for being part of different activities and trying to get a feeling of the community amongst the teachers. Besides getting to know the environment and getting familiar with UCN and the teachers, four main activities has been identified and below there is a chart that displays how time was split amongst the activities.

Working at desk	At the energy department at UCN we were assigned a table each where we could sit and work every day. These desks were amongst the other teachers, but located closer to teachers that were not involved in the Energy Management e-Learning program. These tables were available at all time and could be used as it fitted into the timetable for the investigation. It was a good thing to be invited to work at the UCN and not only come and go when there were specific activities related to the investigation. This meant that there was an opportunity to get a feeling of the environment, be a part of the everyday life and work at UCN, and engage in breaks and small talk with teachers during the days.
Students days	The students were required to participate in classes where they had to be present at UCN. During the current semester the students are required to be present at UCN three times and each time it is over a period of three days. During these days we were present for most of the time. It was possible, through participation and observation, to get an idea of who were the students, to know how they were experiencing the program and to see what did their teachers do when the students were present at UCN, in comparison to what was given on the e-Learning platform. We spent breaks with the students and here it was possible to become more familiar with them and this helped to loosen up the conversations.
The studio	Opportunities to see the studio where the Video Podcasts were recorded arose and was accepted by us, and sometimes there was an opportunity to see the teachers prepare before they started recording, and see them start the recordings. But there has not been an opportunity to see a full recording as the teachers asked to be alone for this.
Interviews	As a part of the investigation interviews were conducted and these took place at UCN. It was of value that we had the opportunity to sit and work at UCN because this made us able to be flexible concerning when the teachers had time for doing interviews and these could be fitted in when the teachers had time.

During the time spent in the field it was decided to spend some days away from UCN. This was due to other considerations like using the library facility and having meetings at the university. Sometimes meetings were held at the university to be able to discuss matters and subjects more openly than it was regarded possible at UCN because our office space was in an open office environment and some topics, for example interview answers from informants, were not deemed fit for discussion in an open forum.

Triangulation (hermeneutic circle +/)

8. Figure Illustration of circular learning process. With inspiration from Gadamer 2004.

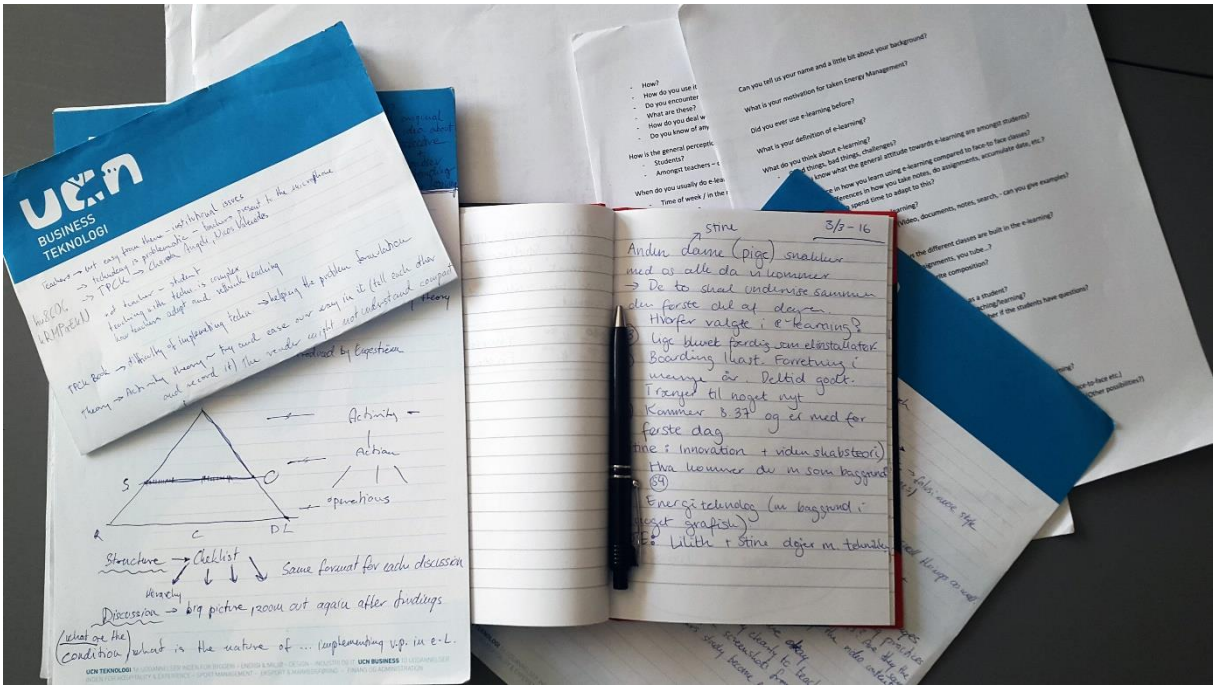
The gained knowledge evolved over time as the field work moved forward (see 8. Figure, page 37). Figure 8 illustrates how the field was entered with one kind of knowledge and ideas about the field, new knowledge was obtained in the field, after this a process of reflections and interpretations of the empirical data collected. This leads to a new understanding and can lead to new wonderings and new questions which is then the platform for a learning circle. The circle illustrates each loop that is part of a hermeneutic spiral, this means that knowledge gained in the field is always evolving and is always dependent on how the knowledge is interpreted (Gadamer, 2004). This is an important aspect to consider as this means that the findings and results of this report is dependent on which knowledge was collected and how this was interpreted. This does not mean that the findings and result are not valid, but the reader has to remember what the premises are for reading and discussing this.

Field notes

While participating in the field an extensive amount of empirical data was collected. This data has been noted in different ways, all according to the specific settings. While being present with the students two different ways of taking notes where applied. In the classroom a computer was used to write down field notes when the students were also using their computer, in this way it did not seem strange that we were noting things in the computer, because everyone was using their computer. In

other examples notebooks were used to write down field notes. When the teaching was happening outside the classroom or no one was using their computer, a notebook was the tool of note taking because it did not disturb the image of the field to much. Some field notes were taken while things were taking place, or right after, others were noted later if it did not fit into the context, this meant going back to our desks at UCN and writing down field notes on the computer.

Field notes have been a big part of this project and the evolution of the investigation. It has made it possible to note happenings, experiences, and subjects, which have been helpful in moving forwards in our investigation (see 9. Figure, page 38), and also to go back to the notes to see the development and see correlations and differences between new knowledge and old knowledge.



9. Figure Field note examples from investigation

Interviews

When conducting participant observation it is not possible to totally separate interviews and participant observation. When participating in the field conversations are formed as it is an integrated part of participant observation to ask questions (Tjørnhøj-Thomsen & Whyte, 2007). But none the less more formal interviews have been conducted during the internship. Formal interview is an interview setup, with interviewer(s) and informant(s). A formal interview is a structured interview and it is guided by pre-set questions. The interviews conducted with teachers, students and the head of the department, all involved in the Energy Management e-Learning class.

Semi structured interviews

All the interviews conducted have been semi structured interviews. These have been conducted to give a deeper understanding of certain subjects and questions that has arisen during the research through the interviewee's experiences and unfold the meaning that is attached to this (Kvale & Brinkmann, 2009). The interviews have been conducted as semi structured interviews because by following an interview guide and not a strict schedule it gives the informant opportunity to unfold their world with their own words and interpretations (Kvale & Brinkmann, 2009).

All the interviews were audio recorded with the acceptance of the informants. This was chosen so that it was possible to transcribe each interview and thereby get all the answers from the interview in the given context.

Specifics of interviews

Eight interviews with teachers, each teacher involved in the making of Video Podcast in the Energy Management e-Learning class. Most of the interviews were held in meeting rooms, only one were conducted in a more public forum, though in a private space.

One interview with a student. The interview was conducted at UCN in a public forum, but in a private space with little interruptions.

Questions for the students

Unfortunately there was only one opportunity to interview a student in an actual interview. This was due to the time frame for when the students were participating at UCN and because most of the students had a distance between their home and UCN. Skype and Adobe Connect were considered as possibilities to conduct interviews at a distance, but when suggested none of the students reacted. When asked if they could answer some questions on paper in their own time they were willing to participate. So the interview guide applied in the interview with the first student was conformed to written questions that could be understood and answered without the interviewer present. This did not give the opportunity to elaborate on certain subjects that the interviewer found interesting right away, but there has been an opportunity to contact the informants if clarification was needed and together with the information and knowledge gained through participant observation the data supplement each other.

CANVAS participation and observation

Because the course under investigation was an e-Learning course it has of course been important to get to know and learn about the platform where the students are connecting when they participate in the modules (each semester consist of different modules that the student needs to complete to be

able to complete the semester). This is called Canvas and each student has their own individual account. Access was achieved during the investigation to the system and therefor the researchers could study how the modules were built, the different features and the possibilities to communicate with amongst the students and the teachers. It gave insight to which materials were given and in which order, how the modules were built.

By being enrolled it was experienced how it was to be a student in the system, a teacher and also an outside observer and discover the differences between these different roles in Canvas. Also it was something that our contact at UCN did not have to do before, so it was a process of getting access to the system, without getting us enrolled for exams, and how to enrol us. By this our contact experienced and learned a new feature with the system; how to get outsiders in the system.

Different dilemmas in the field

During the fieldwork different topics and dilemmas arose. The most obvious and the ones which had the most impact and needed the most consideration are described below. However, fieldwork encompasses various problematics concerning involvement of the researchers, for example ethics, validity, access and positioning. It is necessary to understand what is at stake concerning those topics, because the data gathered by the fieldworkers otherwise might be excessively biased.

Consent from participants

While conducting any research it is important to get consent from participants, not only consent but informed consent (Tjørnhøj-Thomsen & Whyte, 2007). During the investigation several participants were involved; teachers, students, our contact and the head of the department. Formal access was achieved through our contact and the head of the department, but teachers and students were not officially asked if they gave their consent. A notice was given to the teachers and a document was passed around with a picture of us, where it stated who we were, why we were going to be there and for approximately how long. By being in the field it became obvious that teachers are used to students from outside UCN. It was not all the teachers who had heard about the investigation, only the teachers involved in the e-Learning class. The students were introduced to us on their first day and were told that we were going to be there and be a part of some of their classes. It has not been until the interviews that the students and each teacher have had the opportunity to give their formal access and consent, but they have be able to show their approval through conversations and participations in breaks and small talks along the way, which they could have avoided more or less, if they did not want to participate.

Expectations from the field

Expectations from the field are something that must be a consideration when conducting an investigation. The expectations are closely connected to the positioning of the fieldworkers in the field, which has been negotiated with the field. In a fieldwork, what is studied, very much effects how observing and how participating the fieldworkers can be. Therefore the context in which one is situated during the fieldwork is important to consider, because these are a part of what frames the possibilities in the fieldwork, and thereby the empirical data obtained (Gulløv & Højlund, 2010). During the fieldwork conducted at UCN several expectations were met. Two examples of that are one from the students and one from the teachers. From the students an expectation arose; that we as experienced students had knowledge about, for example how to write a report and about using different reference systems. Therefore as we became a part of their learning environment and they felt more comfortable with us, they approached us to get knowledge and share information on how they were developing skills. At no time was it hidden that we were there as students who would like to observe them and engage with them to find out knowledge for our own gain.

From some of the teachers there has been an expectation that because we were looking at e-Learning and Video Podcast we must have skills in computer technology and tools, and programs to use for advancing their skills. This came up in interviews, where it was dealt with by telling them our specific intentions with the project and our expertise. Still, feedback from a meeting they had held showed that they would still like some ideas on tools they might use to improve their Video Podcasts.

Language

As the investigation has been conducted by one Danish speaking student and one non-Danish speaking student, the investigation for the most parts was conducted in English. UCN has several international teachers who speak English, they have courses which are thought in English, and when the agreement with UCN was made about the investigation English was not a problem. After spending time there it became apparent that it was a strong composition that we were able to speak both Danish and English. To catch small talks and engage in everyday activities or to get insight in the interactions happening in the classrooms and the teacher's areas, some level of Danish was needed. Everyone could turn to English if they directed their speech to someone who spoke English, but then the conversation was directed at that person.

In the more professional setting English was often acceptable for the participants. The interviews were conducted in English and most of the interviews both students were present, but the interview were led by the non-Danish speaking student. This was chosen because often people from the same country understand the same words for concepts and sometimes fewer explanations are needed. By

having the informant reply to the non-Danish student, they were forced to explain more and seeks more different words. If the informant could not find words or did not feel that the question was explained well enough, the opportunity to explain in Danish was present and the informant and the Danish speaking student could find together a suitable explanation to elaborate.

Analysis of findings: an Activity Theory approach

In the following chapter the findings will be presented. The data has been analysed and evaluated with the help of different analytical tools. The chapter's focus is on presenting the findings using analytical tools of Activity Theory. As it is mentioned in the Analytical Framework for Analysis (page 21.) this chapter is going to be structured by using the Activity System Model and Activity Checklist. The Activity System Model is presented to orderly describe the different concepts within the system. By describing the Activity System Model the reader can get an understand of the basic connections between the different subjects and their intentions, while the objects, tools, rules, community and division of labour of the Activity System are also described. The second section will use the Activity Checklist in order to analyse the data and give an evaluation on the current scenario at UCN and the e-Learning Energy Management class and its teachers.

Activity System Model at UCN and the Energy Management course

It is important to put the different concepts of the Activity System Model in context so the different activities at UCN can be understood. These concepts will be described below using the basic notions of the Activity Theory Model (Engeström, 1987). The concepts are object, subject, community, tools, division of labour and rules. Each of these six concepts will be described in connection to UCN in the following sections.

Object-orientedness

Activities occur in hierarchies (Engeström, 1987). An analysis of activities in e-Learning and Video Podcasting at UCN allows also for identification of objects. Below there is a description of the main objects and how these objects related to each other through hierarchies (see 10. Figure, page 45).

a. The highest order object is to 'integrating e-Learning', where the motive is the global object of UCN.
b. One step lower in the hierarchy the object is 'using Video Podcast' in the current e-Learning system, which of course is still the object of the higher layer of hierarchy. The second layer object now becomes a more focused object for a smaller social entity within UCN. This is the collective object of the headmaster of the Energy and Environment department and the teachers involved in the Energy Management e-Learning programme.
c. A step lower in the hierarchy is the individual objects, which are even more focused and personal objects. These are also connected to the main object but it contains for example the individual teachers' objects, which is to 'give knowledge'.

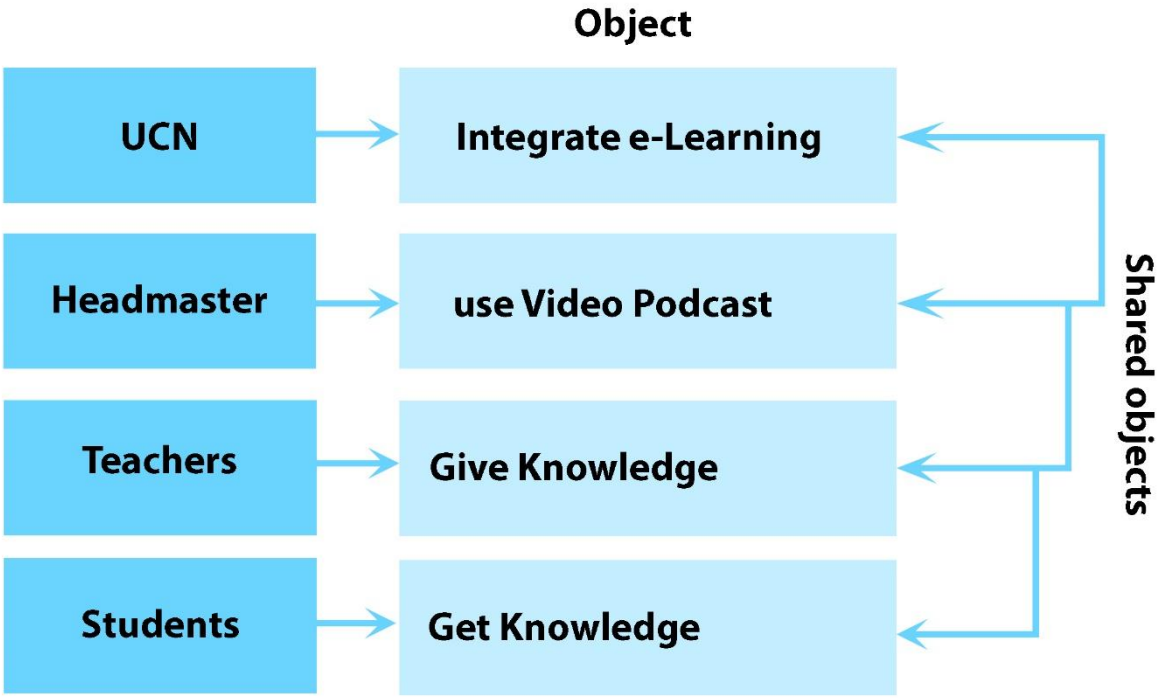
d. Another aspect is the students' object, which is to 'get knowledge'. It is not directly connected to the hierarchy of the layers mentioned above. The students are not in the same Activity System but they are a part of their own Activity System. It is important to show because the two Activity Systems are connected through the students' object and the teachers' object.

In the case of UCN the headmaster has an object of 'use Video Podcast' and this is a decision that is made regardless of the teachers. The teachers have to work with e-Learning but their object is to 'give knowledge'. The hierarchy also influences the activities taking place. When looking at challenges and integration it is helpful to have these different levels which makes it easier to depict each action (Engeström, 1987).

Identifying Subjects

During the research several subjects have been identified, and the most suitable way to categorize these subjects is to describe them based on the same hierarchical layers as the object has been described in the previous section (Kaptelinin & Nardi, 2006).

a. The top subject is UCN, which is the overall social entity, the company which has the main object.
b. The second main subject is the headmaster, who is positioned between UCN and the teachers.
c. The third and biggest social entity is the group of teachers. This subject group is constructed by individuals that are members of a group sharing the same object.
d. Another group of subjects is the group of students. This social entity is a special subject, as this group is the target of all the previously mentioned subjects. UCN, the teachers and the students are connected through their objects.



10. Figure Illustration of object-Orientedness at UCN inspired by Yrjö Engeström's concepts of Activity System Model

Community

In this project the following communities were identified:

a. UCN as the main community consisting all the other communities. This is the tertiary education environment, the school milieu for all the teachers and students.
b. The community of the teachers, which is the community of all the employees, teaching at UCN, with a sub-community of the teachers involved with the Energy Management e-Learning class. The sub-community was the main target of the investigation.
c. The third community is the Energy Management e-Learning students. This community is consisting of four active students.

Tools

For Techno-Anthropologists it is always important and exciting to identify the tools and artefacts of a specific community, to investigate the technology which people are engaged with (Botin & Børsen, 2013). The investigation is primarily concerned with Video Podcast as a technology, which is the main tool. As a conceptual tool, e-Learning is even bigger but in this case the researchers investigate tools which are applied by the subjects of the Activity System. That is the hierarchically highest tool in the Activity System but there are many other main tools of the different Activity Systems, which are important to mention as subjects are engaging with these tools as well on daily basis in order to reach

their objects. All these main tools are connected to Video Podcast on some level. So beside Video Podcast, these main tools are the following:

- Hardware: Smart Board, eBeam, Computer, Microphone
- Software/LMS system: Office Mix, Office Package, Adobe Connect, Canvas

The tools presented are all a part of teaching through e-Learning. Some are more connected to Video Podcast than others. E-Beam, computer, microphone and Office Mix are essential for the teachers to be able to accomplish their objects.

Division of Labour

At UCN the division of labour is following the typical tertiary institution activity distribution. The institution, UCN, distributes the tasks for the teachers. The teachers are using their unique skills to provide knowledge and help the students which are intended to learn, study and evolve. These tasks which are given by UCN to the teachers are distributed according to each of the teachers' qualification. Teachers have their individual expertise within teaching. The tasks are given for the students by the teachers and it is required to complete the tasks in order to succeed the module and to move on to the following one.

Rules

The rules at UCN has a layered structure. The top rules at UCN are shaped by the directives coming from the Danish government and Ministry of Higher Education and Science in general (Danish Ministry of Higher Education and Science, 2016). On the mid-layer UCN as an institution is providing both the teachers and students with the basic frameworks and conditions of the study environment. These institutional rules can be semester goals or imposed educational platforms. One teacher describe in the following excerpt how the basic framework is provided by UCN, while the teacher is able to apply own rules and ways of teaching (Mara, 2016):

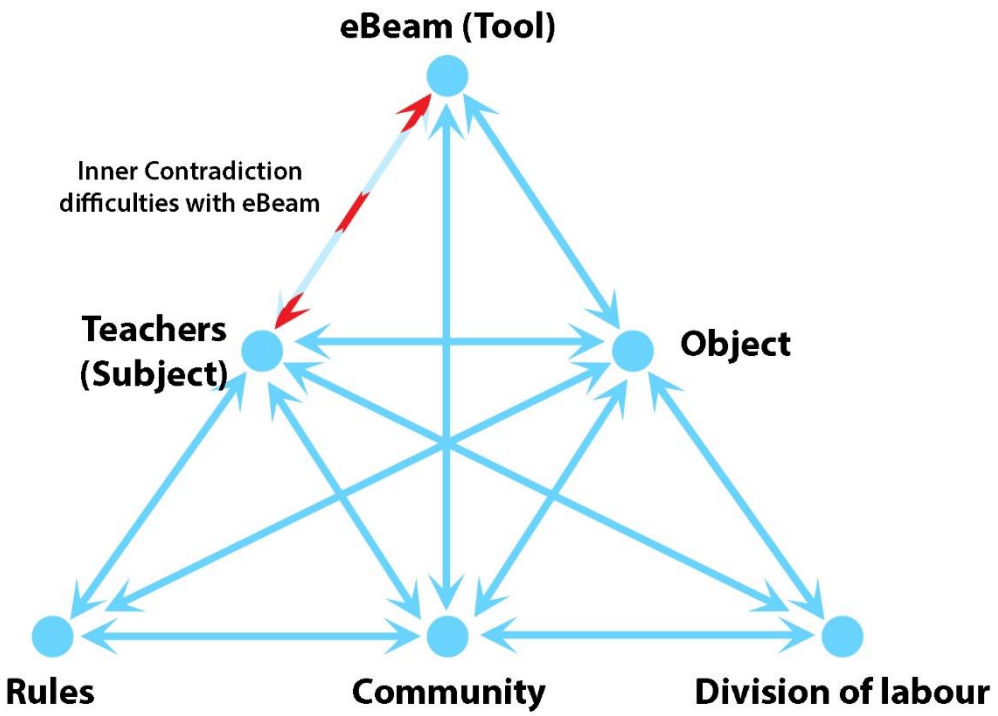
> *Mara: Yeah this is strongly effected with the platform we have and let's say it has its pros and cons but we are trying to adapt our materials so it's as much user friendly and student friendly as it is possible. But I think we tried to make a very good flow of what we have got and our materials can be built in the system. So it effects a lot.*
>
> *Interviewer: Is your teaching dictated by the need of the students?*
>
> *Mara: Well yeah of course it is because the students are our customers (laugh). But it's more about the content of my material. It is also of course our priority to satisfy the needs of the students and provide them as much as we can. I think both to some degree.*

As it has been showed by the quote above, teachers are following UCN's main rules while they are also adding their professional individual skills in the equation, providing an operational and functional rule system for the students. The students are supposed to follow these provided conditions while they are also having their own rules towards the teachers and the institution.

Example of Contradictions

There are possibilities that interplays are not working between concepts of the Activity System as it is intended. It is important to note that contradictions that occur in Activity Systems help to develop the system further (Kaptelinin & Nardi, 2006). In our analysis the researchers were able to identify a number of contradictions of the Activity System which are explained in the following:

- **Inner contradictions**: eBeam is a tool to visually display and share materials in face-to-face classes and in e-Learning classes. It is a sufficient and useful tool for the teachers and students but it is important to be aware that the tool has limitations including technical, legal but also maintenance costs. Teachers at UCN had to overcome the technical difficulties of the tool, such as figuring out how to connect it with the SmartBoard or how to calibrate or change settings of the eBeam. Challenges they have met with the eBeam made the teachers' activities developed (see 11. Figure, page 47).



11. Figure Illustration describing an example of an inner contradiction inspired by Yrjö Engeström's concepts of Activity System Model

- **Contradiction between the concepts of the Activity System**: For example Canvas the LMS system used at UCN, should be the main platform to communicate between teachers and students, but not all tools and platforms are equally satisfying the needs of individuals for communication. Some of the teachers or students prefer other communication channels or approaches to exchange information. To exemplify this point an excerpt from an interview with one of the teachers is displayed (Tamara, 2016):

> *Interviewer: And how did the student reach you? Did he or she use the CANVAS or was it through just an e-mail?*
> *Tamara: I think it was e-mail.*
> *Interviewer: So it was e-mail.*
> *Tamara: Yeah.*
> *Interviewer: Okay.*
> *Tamara: If some of them have written to me in CANVAS I am not sure that I have seen it.*

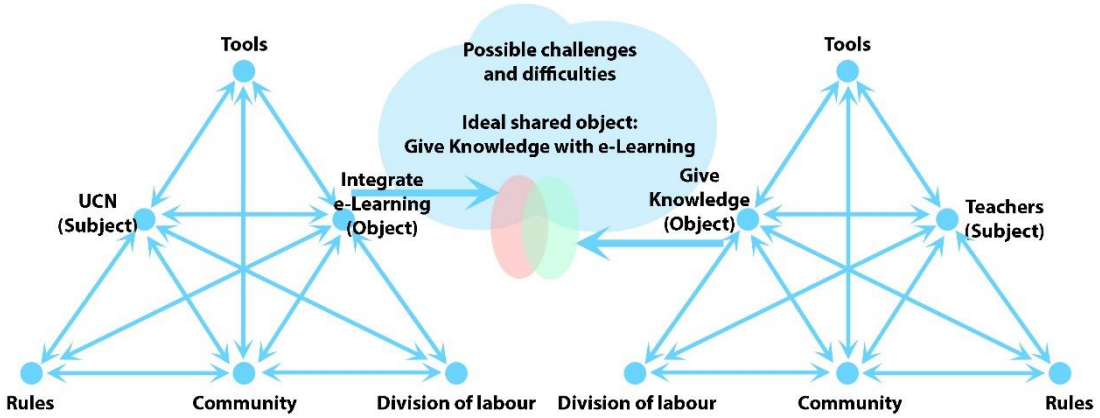
As it has been described in the above quote, there was a contradiction between the concept teacher and the concept tool, as the teacher is not using Canvas as the primary communication tool in e-Learning but use e-mails instead.

- **Contradictions between the existing form of Activity System and its advanced objective:** The advanced object of the Activity System is the object of the highest layer at UCN which is to integrate e-Learning. As an example, not every teacher agreed that e-Learning is the best way to teach students (Mick, 2016).

> *Interviewer: Okay. And what do you think about it, e-learning, what is your opinion?*
> *Mickl: How… hmmm I was quite suspicious when I started. And I will say that I have improved a bit. I am not satisfied by the form that we do e-learning.*
> *Interviewer: Okay.*
> *Mick: I think there are some great problems still yet to be solved.*

The example above shows that the teacher is still sceptical and not convinced that e-Learning can be as equally fruitful as face-to-face education. General disinterest or resistance from the teachers' side could undermine the object of UCN, which is to utilize e-Learning programmes and to incorporate Video Podcasts. However, the teachers at UCN are still at the beginning of the implementation process so as suggested in the interview excerpt above, after some time they may also adopt to the new way of education and the technology connected to it.

- **Activity System Network contradiction**: The highest layer of Activity System can have contradictions with the lower layers of Activity Systems. For instance if the objects between the different Activity Systems are not the same. The highest hierarchy, UCN's object is to give knowledge with the help of e-Learning and Video Podcast, while the teachers object is to give knowledge. These two objects can work together as it has the major joint motive and object, which is to 'integrate e-Learning' but the two are not entirely the same as UCN would like to do this with the focus on e-Learning and Video Podcast. By the slightly different characteristics of the object, the collaboration between the two Activity System is difficult (see 12. Figure, page 49). It is important to overcome difficulties between the two systems with joint work, as the Activity Systems are connected to each other hierarchically (Engeström, 1987).



12. Figure Illustration of contradictions between Activity System Networks, inspired by Yrjö Engeström's concepts of Activity System Model.

After presenting the specific concepts, the basic set-up of the Activity System is displayed. The interplay between the concepts and the activity system contradictions are important characteristics of the activity system as it helps to see the development.

After describing the concepts with the help of the Activity System Model, the Activity Checklist analytical tool will be applied in the section below.

Activity Checklist

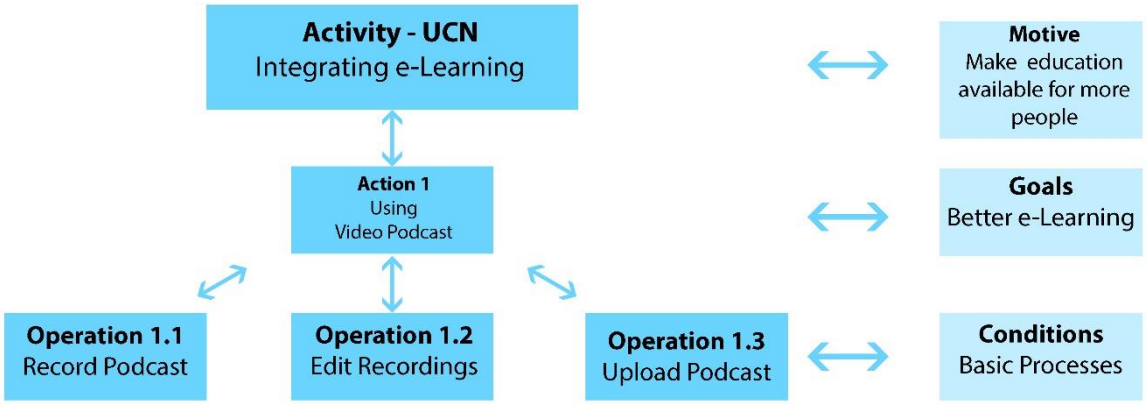
This analytical tool will point to the specific parts of the human-computer interactions and it will explain the key areas of the context. The findings will be analysed in this section using the structure of the four pillar of Activity Checklist.

Means and ends - the Hierarchical Structure of Activity at UCN

Regarding the Video Podcast and e-Learning at UCN, the researchers needed to understand and categorize the different goals and sub-goals of the target actions, to be able to investigate and understand activities within a certain community. Understanding the technology can start with describing the explicit goals of target actions of the different actors such as UCN, Teachers and Students.

First layer hierarchy - UCN

The main activity, is to integrate e-Learning at UCN (see 13. Figure, page 50). As the institutional level is the highest level in this investigation, UCN is the one which formulates the company's desired object, which handed down further on the hierarchy of activities. UCN with this activity has its own motive which is to make education available for more people. In order to reach this desired object, it is required to accomplish different actions. There can be more than one action with its own goal (Kaptelinin & Nardi, 2006). These actions are important as these are required to execute and fulfilled in order to perform the UCN's main activity so it can reach its motive (see 13. Figure, page 50). These actions vary, in this investigation the researchers focused on the new technology connected to e-Learning, the Video Podcast. 'Using Video Podcast' is an essential action for UCN because by executing the action, UCN can get closer to a user friendly application of e-Learning and by that UCN can get closer to its motive which is to make education available for more people. To every action there are operations connected which are the lower-level units of the activity. These operations like record, edit and upload the video podcasts, are basic processes required to execute their main action, which is in this case 'Using Video Podcast'.

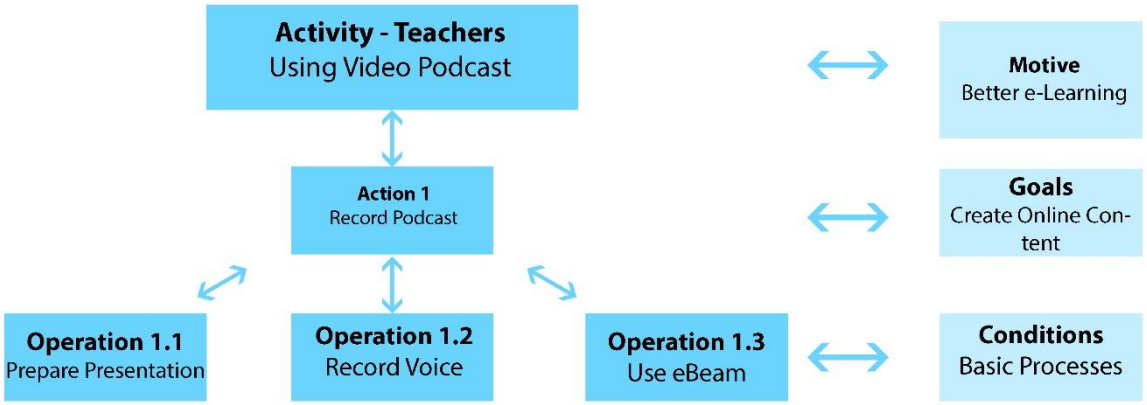


13. Figure Illustration of the hiearachical layers of an Activity System. Illustration inspired by (Kuutii, 1996)

Second layer hierarchy – Teachers

Further down the hierarchy of activities, a new subject is entering, the group of teachers. The teachers are having another level of activity but it is still connected to the activity of UCN as the teachers

are the subjects who are a part of the integration of the Video Podcast. The teachers' motive for using Video Podcast is to have better e-Learning, so it corresponds with UCN's action-goal relationship regarding the use of Video Podcast (see 14. Figure, page 51). This new activity which is 'Using Video Podcast' has its own actions and operations which are all pushing the activity towards, fulfilling the desired object, which is to provide better e-Learning for the students. In order to reach the teachers object, there are many actions connected to the 'Using Video Podcast' activity, and each of these actions has their own goals and when these are reached, the activity can reach its object. There are many actions, such as preparing material for the podcasts, recording the video podcasts or editing the video podcasts. Just as it was in the previous section, where the subject was UCN, there are operations connected to each actions which are important basic processes, many of them are happening unconsciously. As an example when the action is to record Video Podcast, there are connected operation, like preparing PowerPoint presentation, recording voice or using the eBeam.



14. Figure Illustration of the hiearachical layers of an Activity System. Illustration inspired by (Kuutii, 1996)

Activities and Actions

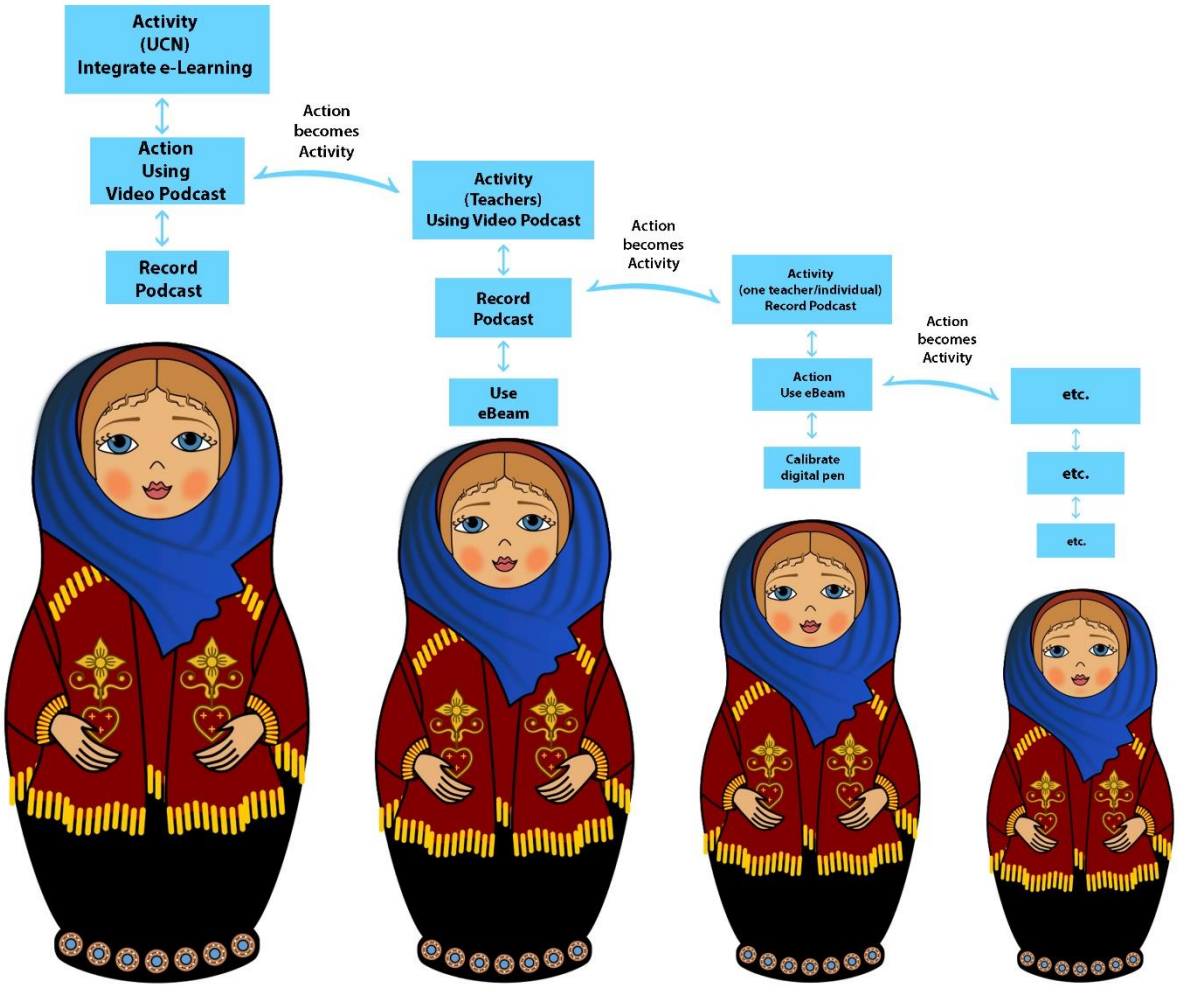
Activities have their own hierarchy and each activity is coupled with one or more actions. In order to understand this characteristic and relations of activities and actions here is an example: Activity 1's action can be the activity of Activity 2 and the action of Activity 2 can be the activity of Activity 3 and so on. The following structure will demonstrate the structures of activities at UCN. The structure below will give example on one activity and one action, but several operations (see 15. Figure, page 53).

- Activity 1 (Subject is 'UCN')
  - Activity
    - Integrating e-Learning
  - Action
    - Using Video Podcast
  - Operation
    - Record Podcast

- Edit recordings
- Uploading Podcast

- Activity 2 (Subject is the ‘teachers’)
  - Activity
    - Using Video Podcast (creating e-Learning content)
  - Action
    - Record Podcast
  - Operation
    - Prepare PowerPoints
    - Record Voice
    - Use of eBeam
- Activity 3
  - Activity (Subject is ‘one teacher/individual’)
    - Record Podcast
  - Action
    - Use eBeam
  - Operation
    - Find and start the pen app
    - Calibrate the pen
    - Choose colour, pen size, etc.
    - Draw and write on the board, in the PowerPoint

This hierarchical structure can also be illustrated by using the matryoshka dolls to describe the nesting characteristics of the activities.



15. Figure Source: (the modified stock image is from jimbongo, openclipart.org 2012)

Illustration describing the nesting characteristic of activities in connection with UCN and the Teachers by using the matry-oshka analogy.

Challenges of e-Learning and Video Podcast

UCN's objective is to integrate e-Learning into education and one crucial action is to use Video Podcast to reach this object. E-Learning and Video Podcast is tightly connected to each other, but in the hierarchical structure better e-Learning is the object and Video Podcast is a mediating tool to accomplish this object. This is an important difference to note because the challenges of e-Learning are not the same as the challenges of Video Podcast.

As a main principal, many teachers are not fully convinced about the use of e-Learning but they agree that Video Podcast is one of the tools which can help reach better e-Learning. An example has been already mentioned in the contradictions section at, where a teacher describes that he is not totally satisfied with the current form of e-Learning. However, the teacher thinks that the Video Podcasts is a valuable tool to be able to reach the e-Learning educational objectives (Mick, 2016).

<u>Interviewer:</u> What is your objective with the video podcast?

Mick: Again a good question. (thinking). Necessity I think. Yes.
Interviewer: Yeah?
Mick: Yeah, basically I think it is necessary for students.
Interviewer: Yeah. And do you think the video podcast helps your reach your e-learning objectives?
Mick: Yeah I think it helps a lot.
Interviewer: It helps, okay.
Mick: Instead of only the presentations that we did earlier.
Interviewer: Can you tell me how do you think it helps? One thing is what you said that they can see it.
Mick: Yeah they can repeat again and again. And also that with the new tools, the e-beam tool, I can make notes in the presentation when I am making it.
Interviewer: That is good.
Mick: I think that is a great advantage compared with the earlier e-learning things we did.

As the above example describes, the teacher likes the features of Video Podcast as a mediating tool to make better e-Learning. The difference between the challenges of e-Learning and Video Podcast is major. It is important to distinguish the two types of challenges as it requires different solution on different levels. The hierarchy of activity in the previous section describe the relationships between different activities and actions.

Another challenge reflected upon by most of the teachers is about interaction. The teachers experience a lack of interaction with the students, a lack of 'feeling' the students as they describe it. The teachers are used to having an immediate reaction from the students when introducing material and new knowledge. In the e-Learning classes the teachers provide material on an e-Learning platform and they cannot see the student's reactions. Below a teacher expresses this (Mick, 2016).

Mickl: Challenges is not seeing the students. Not perceive how they react and these things. Because learning in my opinion is also a quit emotional thing. Not only knowledge it is also emotion, and it… when students get frustrated they actually, in my opinion, learn a lot. But if they do not have any teacher to ping pong with in the frustration, they… I am not sure that they will manage the learning goals.

According to this teacher it is important to include other aspects on learning when providing knowledge to students. It is not enough to provide material. Teaching is also about seeing if the student has understood and moved from point A to point B in the learning. Another teacher expresses this challenge of change from face-to-face classes to e-Learning classes (Noah, 2016):

Noah: It takes a long time to find out how we get the pedagogical into it when we do it without presence (Here referring to e-Learning).

The teacher explains one of the challenges with converting teaching from face-to-face classes to e-Learning classes. One way the teachers can see if the students are keeping up with the course is when the student hands in an assignment which is connected to the teaching subject. The students also have the opportunity to contact the teachers through different technological media for example phone, a-mail and chat function in Canvas, but so far it is very few questions the teachers have had through these channels.

Environment and the tools involved regarding UCN and Video Podcast

The social, cultural world of teachers at UCN will be described in this section, to identify the environment where the activities area taking place and to unfold the different technological tools used by the teachers.

Environment of UCN

The environment at UCN is the tertiary educational institution set up, with the regular teacher – student scenario. Even though the researchers were familiar with the norms and procedures occurring at UCN, there were still many interesting aspects to investigate.

Gather around the bonfire – The Teachers' Lounge

The Office

One of these interesting aspects are the working and communal spaces of the teachers. The working space for the teachers is an open office structure where are no walls and boundaries. The office space is vast and the teachers are working close to each other. Because of the nature of the working space, the teachers are interacting a lot with each other, as they are literally few meters close to each other. As it has its advantages it has its disadvantages as well, such as the lack of private space and time. This fortunately is not a big issue as most of the teachers are spending time outside their offices and they are at the classrooms, having lectures.

Lounge

Another important aspect regarding the spaces, is the teachers' lounge. This is the place where teachers have breaks, coffee/tea pauses or lunch. As time permits, the teachers are spending most of their free time at the lounge. Each department of teachers are having their own tables and usually the members of the departments are not visiting each other's tables. Those tables are representing the bonfire, where the teachers can gather in their breaks. This is the place where they gather, discuss work-related subjects or any other kind of subjects. The tables of the different departments is a place where teachers can interact and discuss whatever they would like to discuss. The researchers

realized the importance of this lounge early in the fieldwork period and were aiming to join the Energy and Environment 'bonfire' as soon as possible, to be able to 'go native[1]' with the teachers. The next excerpt will describe one of the early experiences of the researchers' in the lounge (Hermesz, 2016):

> *Field note the 18th of March 2016*
>
> *'Engaging with the teachers'*
>
> *"Today around 10am we went out to the teacher's lounge to fetch a tea and to sit and engage a little with the personnel. Half of the energy management staff was there, so we just sit next to them. Andrew was having lunch but he opened towards us and asked how the research is going. After that we started to have a conversation, meanwhile a guy called Alfonz sat next to us and Johanne started to speak with him.*
>
> *After Andrew left I just listened to Johanne and the Alfonz's conversation. At some point I managed to join the discussion but we were just talking about eastern holidays, visiting Budapest and cheap beers. The discussion was not connected to our studies, but it was a nice way to bond a little. Even though we did not speak with the others, they have seen us at their table engaging with their co-workers, so next time it might be easier to engage with the others. We will see."*

The above excerpt shows an example of how teachers engaging conversations, and this is a general example of how teachers share knowledge. In many cases it was found that this informal setting of the lounge was a forum of sharing information and experiences between the teachers.

The division of labour

The general division of labour at UCN has been described in the previous chapter (see page dds), but still there are some important details which needs to be addressed. One of these details is the connection and work distribution between the teachers and the coordinator. The coordinator's job is complex, including many tasks connected to teaching and organizing as well. The coordinator is a super-user in Canvas by that she is able to coordinate anything in Canvas, even the teachers' materials. One of the jobs is to teach the students as the researchers have seen it on one of the days when the students were present at UCN. A teacher was sick so the coordinator substituted the teacher in that day. Otherwise the majority of work is to coordinate the happenings in Canvas, be the messenger between the teachers and students, to help the teachers regarding the podcast recordings and to edit, modify and upload the Video Podcasts of the teachers. Her role is quite important as she is able to do

[1] 'go native': is a term that etnographers often use when identifying with their informants. 'To become a native' in reference to Clifford Geertz (Geertz, 1983).

activities which are unique and no other personnel at UCN able to do. This is noted by the teachers as well, just to exemplify it, here is one interview excerpt (Tamara, 2016):

> *Interviewer: In the studio. So have you been thought how to make the video podcast? Have you been thought how to do it, how to use the tools, what you get with the e-beam and all these things or you just figured it out?*
> *Tamara: Yeah. No, I got the instruction.*
> *Interviewer: Okay.*
> *Tamara: I got the introduction to that. And Lisa has been following me the two times I went to the studio. So yeah. And I think that if I have to go over there again I should need some introduction, help again.*
> *Interviewer: Okay.*
> *Tamara: But then after a while you will remember all. This is how to do and this is how to do. Yeah, and put on your microphone and yeah…*
> *Interviewer: Check the batteries (haha).*
> *Tamara: Yeah (laughing) yeah check the batteries. But I think that it is a very big present for us that we can go over to the studio and deliver all the speech and all the finish work, 'redigering', that we have a colleague who have done all that big work. Because if all of us should do that now in a time where we are very busy, I think that it would be a disaster. Because we were not competent to do that. So that she has been listening to all that talk (laughing) and taking out the 'øhøhøh' and put down and make it is professional as possible.*
> *Interviewer: Yeah.*
> *Tamara: I think that that has been a big help.*

The teachers are not checking each other's Video Podcast recordings. They are not discussing in detail how each of them are doing the preparations and the recordings, by that it is difficult to learn from each other as there is no discussion between them about the technological tool. That is also the reason why the coordinators job is important and necessary. The coordinator modifies and edit the recordings uniformly, but it is very important for her that she is able to do this within her ethical boundaries. The following excerpt describe how it is important for the coordinator to aid and help the teachers to make their material more interactive and easily admissible for the students while respecting the teachers work (Lisa, 2016).

> *"So that's all right with me that is different but I always says them, when I'm receive a PowerPoint, before correct in the studio, a few days before. I say "I might change something", I won't change you content but if there are any misspellings, I will correct it obviously. I will put in some pictures and I will make these small animations, like you know… when the text comes in one after one, not just all the text in one. And also with the pictures. Actually quite*

lot of the teachers don't use animations in their PowerPoint. If they use PowerPoint they don't use animations. But that's what I do, I don't change the pictures because if I change so they won't be able to recognize their own materials, then they will do like this slowly. Some of them well… I think it is also a kind of respect for their materials and the way they teach and I think that is very, very important. Because my goal is to make a video and that's it."

The described example also shows that on one side the coordinator has the expertise to do the final touches on the podcast recordings, but she also respects the teachers' expertise, which is the knowledge connected to the different subjects within a course.

Available tools

The focus of the investigation is on the Video Podcast, but the teachers are possessing other tools as well which are integrated in their e-Learning teaching and which are necessary tools to perform the teacher's e-Learning related actions. The Video Podcast as a target technology is the major technological tool for the teachers teaching in the e-learning Energy Management class. The Video Podcast is a complex tool, integrated with many other technological tools as well. The main frame is the teachers' PowerPoint presentation which is uploaded with a software called OfficeMix to transform the presentation into a podcast. This software allows the user to record the presentation and the sound of it and then produce a video out of the recorded material. Beside the software there are hardware tools as well which are helping the podcast recording, such as the SmartBoard which is connected to Office Mix, so the teachers can use the board to interact with the software. The eBeam which allows the teachers to draw and highlight certain parts of their presentations, or the microphone which is there for sound recording purposes. All these tools are integrated as podcast producing tools. These tools are facilitating the creation of the online content for the students.

There are other tools as well which are helping the education of the online students. The first tool is UCN's LMS system, called Canvas, which is the online communication, administration and reporting surface for the teachers and students as well. This is where the podcasts are uploaded. Additional tools used by the teachers for educational purposes such as PDF files, YouTube links, online and scanned articles. Also there are classical tools for the teachers when the students are present at UCN, such as smartboards, white and blackboards, projectors and the teachers' personal teaching tools. All previously mentioned tools are important parts of the working activities and connected to each other in order to provide knowledge for the e-Learning students

Connection between the tools and teachers

The teachers agree that Video Podcast is a valuable tool for them to provide knowledge for the students. This not means that the use of the tools integrated in the podcast production are sometimes challenging or frustrating for some of the teachers. There is an initial inconsistency between some of the tools and the nature of the teachers' environment. Of course this inconsistencies changes after some time and further experience. In the following interview part, one of the teachers describe a challenge where he did not realise that the batteries depleted before the start of the recording (Clark, 2016):

> *Clark: Oh like this… Yeah I… I two times tried where the batteries went dead, and I did not notice, and I have been in the studio for two or three hours, and then Lisa came back; well there is only audio on the first half.*
> *Interviewer: Ohh.*
> *Interviewer: I would not be happy.*
> *Clark: I was not. And actually I had a problem last time as well. So I tried it two times, and now I am very careful.*

There are other kinds of challenges as well with the technological tools. These are not physical but more like psychical difficulties such as frustrations. For teachers the podcast recordings are bringing many new experiences and challenges which were not present before. The characteristics of these technologies are not necessarily consistent with the nature of the teachers' environment. For most of the teachers being in a studio and recording without audience is not what they have been used to. The following excerpt will demonstrate the feelings of one of the teachers' about being in the studio and record without the presence of students (Alfonz, 2016):

> *Interviewer: Do you know what is the general attitude about e-learning between the other teachers? What do they think about it?*
> *Alfonz: I think most of the teachers are afraid of it. (laugh) That's why our studio, we don't have a camera. It's only the slides or whatever you draw, it's only your voice and maybe your hand drawing. That I think that helps a lot, but still this recording you voice. Maybe hearing you own voice, or make mistakes I think a lot of us is afraid of that. We have to get used to it.*

This excerpt also shows how the lack of experience affect the teachers' relation to the Video Podcast. Because of the inconsistency between the tools and the teachers' environment, some teachers felt frustrated by some features of the Video Podcast recording. To exemplify this point the researchers describe an excerpt where a teacher felt inconvenient about listening his own voice after the recording (Alfonz, 2016).

> *Interviewer: Most of the people don't like hearing their own voices from… It's the same for me, I think it sound silly.*

Alfonz: Yeah, exactly so when you go home and you hear this again…
Interviewer: I hate it. (laugh)
Alfonz: That's maybe because it sounds different because when we speak we hear our own voice, then it sounds differently, when we hear it from the speaker. So that's a challenge. But it helps a little bit when we have Lisa to make all the editing. Actually I think this editing part of the videos, I think it's fun to do, but I haven't done it yet. But actually I think it is pretty fun to make all these corrections and… yeah. But hearing myself, that's… not good. (laugh) When you use a microphone, a lot of people are afraid of that.

Of course this inconsistency and intimidation is apparent because the teacher can hear his/her own voice, which is not a major challenge with the technological tool, but for people who are not experienced with this kind of activity, it can be a frustrating in the beginning.

After describing the environment and the technological tools used by the teachers, the following section will describe the internal and external components of the different activities occurring at UCN.

Internalization and Externalization

As activities have both internal and external components, it is important to see what kind of internal and external effects is happening with the teachers during the integration of the Video Podcast. As the technology is fairly new for the teachers, it is assumed that the physical manifestations of externalization will happen as the internalization process is ongoing. This section will analyse how the teachers are coping with the technology and how they externalize and internalize different actions and operations connected to the Video Podcast.

Group and individual internalization

The differentiation between group and individual internalization is an important factor at UCN, and it is related to the teachers who are involved with creating the video podcasts. Investigating the subject of the activity is required both on the group level and the individual level as well (Bellamy, 1996). On the group level the internalization is happening continuously as the teachers are spending more time in the studio, the outside help is required less. In the beginning the coordinator was guiding the teachers and was helping them to do the actions properly in the right order. After one semester the teachers as a group are feeling more confident with the Video Podcasts. The following field note is an example of a teacher getting ready for recording Video Podcast with the help of the coordinator (Jensen, 2016 March):

Field note the 10th of March 2016

'Recording of Video Podcast'

The coordinator and the teacher were preparing to start the recording, The coordinator was there physically giving the keyboard to the teachers, telling how to calibrate

the smart board, starting the required programs while she was talking out loud and telling to the teacher what is she were doing. The coordinator was the external help, she was the one who helped the teacher externalizing the required actions to reach the objective of that activity which was to record their presentation. After some time the coordinator told us that the teacher needs her help less and less as the time goes on and the teacher are starting to internalize the different steps.

The field note shows that the recording of the Video Podcast is still relatively new for the teacher so actions are articulated by both the coordinator and the teacher. The podcast recording still happening by externalization as the teacher have to go through the different actions step-by-step.

Even though the internalization is happening on the teachers' hierarchy level we showed the hierarchy structure), and the coordinator is pleased with the current learning curve of the teachers regarding the podcast recordings, the individual experience is equally important. The individual cognition is a key element as each of the teachers should feel self-confident with the Video Podcast recordings. On an individual level the teachers are reacting differently to the integration of Video podcast. As it is mentioned in the previous paragraph the teachers were not having major problems with the internalization of the Video Podcast recording activity, they only required some familiarity, experience and time, but it is very different how the individuals are adapting and internalizing. It is important to consider the individual when we talking about internalization and externalization as each person reacts for objectives and the connected actions and operations differently (Kaptelinin & Nardi, 2006).

Familiarity

The integration of Video Podcast was a high level decision from UCN. After considering the right teachers for the task, ten individuals were chosen by the headmaster to teach the e-Learning Energy Management class. The coordinator was trying to get the teachers more familiar with the e-Learning and Video Podcast with the help of workshops.

The coordinator and the headmaster are both people, who have a broader and overall view on the teachers who are dealing with e-Learning and the Video Podcast recordings. They both feel and experience that many teachers are afraid, mistrustful or hesitant about e-Learning and the Video Podcast, but also they hope that this can change after teachers become more familiar with the new initiative. The following quote will describe the headmaster's idea on the teachers' overall attitude when introduced to e-Learning (Jim, 2016):

<u>Jonathan:</u> I think most of your teachers think that e-Learning is very difficult and therefore it is very frightening but when they get used to it I think it will be better.

The headmaster expresses his experience with introducing video podcast to the teachers and how the headmaster expect the teachers attitude to change as they get more familiar with the technology. As internalization gets deeper, the teachers will be more familiar with e-Learning and the Video Podcast recordings so hopefully by some time and experience they can change their perspectives about it.

Experience

In order to get deeper familiarity with e-Learning and Video Podcast it is important to gain experience with both the online education and the podcast tool as well. After repeating the activity of recording podcast, teachers are able to gain more experience about Video Podcast. In the following example, one of the teachers describe how the learning process was quick and easy (Alfonz, 2016).

> *Interviewer: What are the challenges when you there at the studio? You said it is not easy because there is nobody to talk to, also the microphone thing. Are there anything else which is not easy to do?*
> *Alfonz: When you have tried it a couple of times, actually after the first time, it is very very easy. What we are using now or what I have been using is an add-on part for office. You just open your PowerPoint and press record. You can take one slide at a time. Very very easy. It adjust the sound level and yeah… So that's pretty easy to do.*

Executing the video podcast recording process a couple of times made him more experienced. Even teachers who were the most hesitant about e-Learning was thinking that after some experience with the recordings the activity gets more and more familiar. This indicates that the internalization of the different tasks and operations is quick regarding the podcast recordings. One example of this is expressed by a teacher in the following (Mick, 2016).

> *Mick: […] there was a barrier of course for me also to go into this e-learning and to speak to my presentations without any students. But I think a couple of times of doing this I felt comfortable about it, so there was a barrier and then it went on.*

Gaining experience can help to avoid mistakes in the future as well. Dealing with a major mistake, for example forgetting to check batteries in the microphone, can be serious enough that the internalization of the process happens instantly and the mistake will be avoided the next time, not just by the teacher who made the mistake but the other teachers as well, as they heard the story about the unfortunate situation afterwards. A personal mistake can help the group internalization if the experience is shared (Bellamy, 1996).

How experience at UCN and with technology affects the attitude

Through conversations and interviews with teachers another aspect of internalization arose. It became apparent that it is not only the experience with the technology Video Podcast in itself which

fosters internalization. What was experienced was that it is also concerned with the attitude of the teachers towards the technology. Below a teachers explains the introduction to Video Podcast (Mara, 2016):

> *Mara: How long I have been working with e-learning? Well since officially since I started from February, but I had some trials and I made some videos before it all started. So basically it happened around October last year, when we realized that the tool called office mix could actually be a great help when somebody wants to make a video. We made videos just to see how it works and also I thought if I would be away and the students cannot have the lecture, or we are sick, the students can just have the material uploaded. So this could be another way of doing things so students don't miss topics. I was sick, I was on vacation I could actually have my material ready; just make a ten five minutes video. It wasn't so advanced it was really the beginning and I didn't know how to do it.*

The excerpt shows that the teacher engaged with the technology before actually having to do a recording for a class. The same teacher also expressed that spending time on e-Learning, searching for material on e-Learning, when introduced to it was something the teacher spend time on. In general this teacher shows a positive attitude towards new technology and sees possibilities with the use of it, as the teacher notes that the Video Podcast does not only bring flexibility to the students but also brings the possibility for more flexibility in the teachers teaching. Another teacher also expresses this positive attitude towards Video Podcast (Clark, 2016):

> *Clark: Only this semester. This is the first time I have tried it so it's a little bit new for me and a little bit excited as well (about e-Learning).*
> *[…] because it's not only the student that has the flexibility. Also the teachers. I can do it in the weekend, I can do it in the evening, I don't need… I can fit it into my normal schedule. When I'm introducing the presentations, I just have a deadline. I need to have it finished, but I can do it whenever I want. So it's not just the student who can watch whenever they want, I can make it whenever I want.*

This teacher does not have a lot of experience with e-Learning, but did not find it difficult to learn. The attitude towards applying this new way of teaching is positive and this teacher also sees the possibility for more flexibility for the teachers by the use of Video Podcast.

What both of these teachers have in common is that they are relatively new at UCN. Teachers who have been teaching at UCN for longer in general have a different attitude. Not a negative attitude, but the teachers are often more hesitant towards the use of e-Learning. This next excerption is an example of this (Mick, 2016):

> *Mick: […] Hmmm I was quit suspicious when I started. And I will say that I have improved a bit. I am not satisfied by the form that we do e-learning.*

I think there are some great problems still yet to be solved.

The teacher here expresses an attitude change, which happened through using the technology. Also the teacher says that the current situation with e-Learning is not satisfying. This does not reflect a negative attitude towards e-Learning, but it illustrates a difference in perspectives on e-Learning amongst the teachers.

The attitude towards the technology is important to the aspect of familiarity because the attitude can affect how much the teachers engage in the new technology and thereby learn and internalize the activities (Bellamy, 1996).

Time

The second important factor to get familiar with the Video Podcast is to spend enough time with the technology. For some people internalization requires more time thereby it is important that enough time spent in the studio. The excerpt in the following describes one of the teachers' idea on how her inexperience is connected to the amount of time she spent in the studio (Tamara, 2016):

> *Interviewer: Did you face any challenges during that one and a half hour while the recording was…?*
> *Tamara: Yeah there were some technical things were suddenly the board would not do as we wanted it to do.*
> *(…)*
> *Tamara: But maybe it is just because I have only been there twice.*
> *Interviewer: Yeah.*
> *Tamara: Maybe if I have been there ten times maybe I do not think about it any longer it just start everything up, but I am not sure of that…. (laughing) because of the time (laughing).*

Another perspective of time is important when it is about internalization, which is the given time for teachers to interact and use the Video Podcast. Most of the teachers agree that the given time is not enough to deal with the podcast recordings as the teachers got no extra time for e-Learning besides their regular, face-to-face preparation. The coordinator also mentions the time factor connected to the e-Learning education (Lisa, 2016).

> *Lisa: […] when I was hired and they found out why I was here for... I had workshops with the teachers. I would have wanted to have three workshops but I have only managed to have two because there wasn't time for the third one. I could tell that some of them were like "okay I'm gonna… you won't be able to see me, will you? No. Okay!" They were very concerned about am I given extra time for this. Because they hadn't been told if they will be given extra time and obviously they have given not.*

As it is described in the above paragraphs, some of the teachers are still externalizing many steps of the activities and they requires the coordinator's help, while some of them can go to the studio and can act on his or her own. Some of the teachers were dealing with e-Learning and video recordings before, some just started using the technology this semester. The fact that some teacher are experienced some less experienced, and the fact that some teachers still getting familiar with the new technology while others had no problem with adaptation, are important factors considering internalization and externalization.

Development

As the activities, described in section Means and Ends, teachers and the students are undergoing development. It is required to analyse the experience with the Video Podcast, to see what kind of experience were gained so far and to describe the current attitude towards the technology. This section will describe the development at UCN regarding Video Podcast with an emphasis on the first e-Learning Energy Management semester.

Development of Activities

First of all it is important to show that development was already happening before the ten teachers started to work with the e-Learning Energy Management students. There had been five years of trial and error before reaching the point of the researchers' investigated UCN semester. These five years were crucial to eliminate errors and to develop the whole e-Learning education at UCN and the use of video materials. In the following excerpt the headmaster describes the timeline of integrating e-Learning (Lisa, 2016).

> *Jim: It is a long story. Five years ago we had started a research programme because my burning wish was to implement it in our programme. But we didn't know how to do it, so we used three years researching and what is the best for our kinds of students. We did something which was absolutely not the thing which works for our students and we did some good things and thing between the middle. After three years of research we have come to a decision which was either clean e-learning or clean present education. Not a mix of these two. Then we have been having two clean e-learning programmes after this but the first one who is really made for e-Learning is the one which Lisa today. Five years we have been working e-learning and I think now we are where we have to be, we have some good thing to offer for our students. But it had been lasting for the last five years and we have been burning our fingers a couple of times.*

At UCN the teachers as a group are working towards the object of their activity, which is to implement Video Podcast into their e-Learning courses and by that to give knowledge to the students. Just as it is with the individual level of evolving, it is not always the same between the members of the group either. Some of the teachers are developing slower, some quicker just as it was the situation

with internalization. Here another factor can be important to consider as not just experience should be taken into consideration, while one is investigating the individual teacher's level of development. Also, the personal beliefs of the individual are important as not every teacher has the same opinion about e-Learning and Video Podcast (Bellamy, 1996). Some of the teachers think that e-Learning is not the best way of teaching specific subjects. Teachers are not reluctant about the podcasts but some of them question the effectiveness of e-Learning in general.

Teachers are open-minded about the technology in general and their attitude towards the system is becoming more positive. Many of them are interested about possible extra technological tools which can help their work and enhance their e-Learning teaching skills. This good intention toward future technology indicates possibility for further development. Another thing to consider is how internalization is helping development. The two things are strongly connected as internalization is helping to learn and develop different actions and its operations (Kuutii, 1996). It is important to remember that recording Video Podcasts and teaching in e-Learning is a big change in most of the teachers' practices. So even though the concept and the technology is not necessarily the most complicated, the community of teachers who are dealing with it needs time and effort to understand, use and develop it (Bellamy, 1996). Most of the teachers agree that e-Learning requires different teaching than face-to-face teaching. Below a teacher express how the communication is different in e-Learning and face-to-face teaching (Tamara, 2016).

> *Interviewer: That's the difference how you teach in a regular class and with e-learning. Because you said there is a difference how you prepare?*
> *Tamara: Yeah, because I have to be prepared what am I really going to say I just can't say something hahaha and say ah no. I can't say a failure. I have to be very aware about what I'm going to say. And they are going to listen again and again and again. I think there is a big difference between speak you stuff to the digital learning and just come in and talk and go out again. Because there are so much more noise in the physical room, so the coding when we are talking together, there is not a lot of noise which can come between us. But when you are listening that, sitting there with your headphone and you can listen and listen again until you think you understand it.*

The teacher expresses that, when using Video Podcast as a teaching tool the teacher needs to be more precise in the explanations, and this means that the teacher have to prepare more before class compared to face-to-face classes. Amongst the teachers there is a big difference in how much preparation time they have to prepare for Video Podcast, and this is crucial when talking about the attitudes towards the new technology.

Feedback from students

Development requires feedback. In order to improve there is a need to get feedback from the students. For a long time, teaching had been based on the mutual communication between teachers and students. At UCN's face-to-face programmes, this traditional relationship between teacher and student is present, while at the e-Learning Energy Management class this relationship is rather asymmetrical. Developing the Video Podcast and thus the e-Learning programme is a learning process. Development/learning happens through experiences obtained through different actions. This also means that through feedback the outcome of activities can be assessed and the different activities can be evaluated.

As explained it is important with feedback when learning and developing. The students are included here because they give an interesting perspective on the e-Learning. If we look at the activity system the teachers are the subject(s) and the Video Podcast is the mediating tool to accomplish the object, which is making better e-Learning. When evaluating if the object has been reached it is therefore important to include the students who are receivers of this connected object, e-Learning. For the teachers the e-Learning is a way to provide knowledge and learning to students in Energy Management. And for students e-Learning is a way to achieve a degree and education in Energy Management, so to receive knowledge and learn.

In the following feedback from the students are included to get insight into the experiences from students and get their perspectives on the e-Learning programme and Video Podcast.

Feedback

In general the students are satisfied with the e-Learning program. The students emphasize the flexibility of e-Learning as one of the main positives. Two quotes from students are here put forward to highlight this (Owen, 2016) (Jacob, 2016):

> *Owen: It is flexible and I can study when I have time and opportunity to do so, and organize it in accordance with my work and family.*
>
> *Jacob: I think e-Learning is something of the best I have ever tried. I am crazy about everything. It fits perfectly in my life. I think my co-students feel the same. The only thing that need a bit of changing is Canvas; it is a bit messy and hard to navigate in.*

The students express that they are positive towards e-Learning and it fits their lives well. One student remark that the platform Canvas is *"a bit messy and hard to navigate in"* and this is an opinion that other students back up to some extent. There are also some features in Canvas that some of the students finds challenging. This next student find it challenging to add certain material to Canvas (George, 2016):

> *George: I follow the system slavishly. I write everything in word before I copy it to Canvas, because I think it has a lot of limitations. One is not able to write formulas and inserting a picture requires a huge detour to insert pictures.*

The interplays between student and tool is not working as intended and to be able to accomplish the assignments given through the system the student find new tools and methods. In addition to the use of Canvas the students express that each module is formulated clearly and most of the students follow the built of the modules. This means going through the material in the way intended by the teachers and the coordinator.

The teachers experience a lack of interaction with the students. The interaction aspect is also something the students encounter and mention. But here the opinions are divided. The next two quotes illustrate the different opinions about interaction (Owen, 2016) (Jacob, 2016):

> *Owen: I think it is harder to learn on a computer because it lacks the conversation with the other students.*
> *E-Learning brings me education. Face –to-face gives me more, because you can talk in class and with the teacher.*

> *Jacob: I think it is much better than face-to-face. It is much more intense. And there are not someone asking questions all the time. I think that podcasts are perfect for me. I can see them when I have time and in a concentrated way so that there are no one asking questions along the way.*

In the above the two different opinions are clear. One student is missing the interaction which takes place in the physical classroom and the other student experience this lack of interaction as a lack of disturbances which optimizes the students learning. One thing that all the students have in common is the positive effect of Video Podcast in the e-Learning. The students express that the Video Podcasts gives them a good introduction and insight to the different subjects in the modules. The e-Learning and Video Podcast especially provides the opportunity to review and repeat the material and the explanations from the teachers, the following student express this (George, 2016):

> *George: I get more out of it because I can go back in the material and re-read when it suits me, I can break and think the things through. On the other hand I am always behind on assignments because I have a lot of other things to do.*

It is not only the students who see this as a good ability (Mick, 2016):

> *Mick: I think it is the possibility of repeating the session. […]Or it could also be hearing the explanation from the teacher. […] It could also be that. I think it must be the two things that are the advantage of the podcast.*

The feature of repeating and reviewing is something unique to the Video Podcast compared to the face-to-face classes.

Sum-up

In the present chapter different aspects have been identified and presented. Firstly the concepts of the Activity System was clarified, the interplays between the concepts and contradictions were introduced. Examples of contradictions between different concepts, when for example teachers prefer different tools to reach their object. Another contradiction is between Activity System and advanced object, when objects of different hierarchical levels are not connecting. A third contradiction is a network contradiction where objects of Activity Systems not correlate.

In challenges, three examples had been identified, such as teachers being hesitant with e-learning, teachers missing the interaction in the e-Learning class and the teachers also expressed a challenge when converting teaching from face-to-face classes to e-Learning classes. Other findings were, that teachers do not share their experiences and do not use each other as a sources of knowledge. Also time became an apparent factor related to the technological use. Little time spent with the technology lead to the lack of experience, which results in lack of familiarity. In general the teachers find the Video Podcast a useful tool, when teaching in e-Learning class.

The students satisfied with e-Learning, though they are not satisfied the way Canvas is structured. Also some students feel that they are missing interaction with the other students and the teachers. All the students agree that Video Podcast is a valuable tool for them and their e-Learning experience.

Discussion

In this chapter different aspects and challenges of e-Learning and Video Podcast will be discussed in another perspective in order to highlight factors which can affect the integration of Video Podcast in e-Learning. One of the primary objectives of this report has been to investigate the integration of technology in a learning environment with specific focus on the integration of Video Podcast in e-Learning at UCN. E-Learning makes studying available to a broad range of different students without physical restrictions of the buildings of the learning institution. This online education is flexible and it can adapt to the various schedules of students. Video Podcast has been introduced at UCN with the intention of making e-Learning better. This has made it an important point to look at the challenges connected to integrating and using technology as a mediating tool in a learning institution.

Some challenges met in connection with the use of Video Podcast in e-Learning can possibly occur because of different, though connected, aspects of introducing new technology in a teaching environment. Three distinctive aspects that can have an impact on how the technology and the outcome of using the technology is perceived, is; the knowledge that the subjects of an activity possesses, the transformative nature that a technology can hold, and third the context and culture in which the subject is embedded and the technology is introduced.

Missing interaction in e-Learning

During the investigation it became apparent that one aspect was a concern of the teachers. They emphasised the challenge of missing interaction with students when using e-Learning. In general the teachers agreed that they are missing the opportunity to practise and use their pedagogical knowledge when teaching the e-Learning students.

In a traditional teaching setting the teacher is present in the same time and space as the students and there is interaction and immediate reaction. By using e-Learning as a main learning platform there is a shift in the interaction between teacher and student, the communication becomes more asymmetrical. As shown in the findings one teacher express a challenge by not being able to utilize the student's frustration in a learning process, as it is done in face-to-face classes. When using e-Learning the teacher is missing the communication with the students and because of this the teachers is unable to practice some of his regular pedagogical tools. TCPK (Technological Pedagogical Content Knowledge, suggests that teachers must possess different types of knowledge (Angeli & Valanides, 2015). In the case of the teachers at UCN they possess both content knowledge and pedagogical knowledge, and it can be argued that they also possess different levels of technological knowledge. The challenge met by the teachers can be described as a challenge met in the intersection of pedagogical knowledge and technological knowledge. In this intersection the teachers are

dealing with the challenge of combining their pedagogical knowledge with their technological knowledge, and technological possibilities available. The teachers have concerns about delivering knowledge to students, they are concerned if their content knowledge is mediated in the right way in e-Learning.

When trying to convert face-to-face classes into an e-Learning class the teachers are trying to convert their pedagogical content knowledge to the e-Learning platform. And here the teachers experience the challenge of combining the pedagogical knowledge with the technological possibilities. The teachers and UCN is working towards; making the e-Learning experience equal to the face-to-face classes. It is a broad conception that an e-Learning programme should contain the same elements as ordinary classes. Tools are brought in to make the e-Learning possible and Video Podcast as a tool has been brought in to assimilate some of the teaching happening during the face-to-face classes.

Video Podcast is deemed as a tool that can help the missing pedagogical aspect. The teachers feel that the Video Podcast can bring the e-Learning concept closer to ordinary face-t-face classes. Video Podcast gives them the opportunity to use their pedagogical skills when they explain their subject to the students. The teachers who have more experience at UCN generally express more concerns with the use of e-Learning, but see the possibilities for Video Podcast to be an asset for the improvement of e-Learning. They see it as a potential to getting their pedagogical skills more in motion. Video Podcast provides an opportunity for them to emphasise which subjects in the material is important to notice and it gives them the opportunity to use for example eBeam to make a more interactive explanation of certain subjects.

A notion of Transformative nature of Technology

As mentioned in the above section UCN are trying to convert content from face-to-face classes into an e-Learning class. So the question often asked at UCN often becomes, which tools can be brought in to fill certain needs of e-Learning to resemble an ordinary face-to-face class? This focuses on how can the characteristics of ordinary classes be brought into an e-Learning platform, with the same skills and knowledge that is used in a face-to-face class. It does not focus on how an e-Learning programme could be structured and built with knowledge of the tools available, and the transformative nature of these tools.

UCN is constructing an e-Learning programme by looking at the content they have and then they fit the tools which are required. Another way to start a construction could be to consider possible tools, the nature of these tools and then fitting the content (Angeli & Valanides, 2015). Maybe by looking at the transformative nature of the tool(s) and what it brings the students some of the challenges experienced would be transformed into possibilities for both teachers and students.

Changing practices

The integration of e-Learning is not only dependent on the tools available and the teacher's ability to utilize the tools. It is also the ability to change practices and adopt new practices. There have been contradictions in interplays between different concepts to make the new technology fit the teachers every day work practices. Two examples can be drawn in; time as a factor and communication tools. One teacher mentions that as a communication tool e-mail is being used because the teacher is familiar with this. Not only is the teacher familiar with e-mail as a form of communication but the e-mail is a part of the teachers daily routines and requires no adaption to new practices. Several teachers point out time as a crucial factor when preparing material for classes. Time is an important factor when talking about introducing Video Podcast. Some teachers have only been to the studio few times and others have done more Podcasts. The experience that the teachers get by creating the Podcasts eliminates some of the challenges they met in the beginning because it is about learning by doing. But in relation to the usage of and attitude towards Video Podcast time is important because there is a difference in how much preparation time each teacher has for their specific subject. The research showed that there seems to be a connection between preparation time, and how a teacher perceive Video Podcast. If a teacher has little time for preparation the creation of the Video Podcasts seems to create more work and take time from other tasks. But if a teacher has more preparation time, the Video Podcast seems to bring the teacher more flexibility in their general workday.

These two examples are both related to changing practices. The first is about contradictions in the interplay between a teacher and a tool, and with the community. Because the teacher is not using the tool connected to e-Learning to communicate with the e-Learning students. This way of communication has been accepted in the community. Why this is important is that if e-Learning is to work effectively for the students, they at least need to know what are the communication ways to each teacher, one that the teacher uses. Otherwise students might not find that they can contact the teachers and this can inforce the effect of missing interaction.

The second example about time can be seen as a contradiction in the interplays between community, subject and rules. The practices surrounding preparation for classes are dictated by the rules, at least the time aspect of it. And these rules might not fit the new practices surrounding Video Podcast. The community and the subject have accepted the normal practices of conducting work and preparation. This can in the example of the Video Podcast maybe stand in the way of new practices which could fit the utilization of Video Podcast better. Maybe if some practices were changed the flexibility of Video Podcast would be a bigger part of the teachers work practices. These practices are deeply embedded

at UCN and each teacher had their own adapted practises. These practises are effected by and constitute the culture at UCN. There for it is not an easy task to change the practices.

Conclusion

The purpose of this investigation was to describe the nature of integrating Video Podcast in e-Learning education. This has been achieved through a Techno-Anthropological study, by applying Activity Theory which resulted in gathering a collection of knowledge about the main characteristics of Video Podcast integration; challenges and opportunities. Furthermore this investigation had the intention of clarifying the teacher's ability to achieve their learning objectives.

The problem formulation, established to find answer to these questions:

What is the nature of integrating Video Podcast in e-Learning education and how does the technology affects the teachers' ability to achieve their learning objectives?

Through the investigation insight to the history of the development and the context in which the Video Podcast is being integrated in. The study showed both strength and weaknesses related to learning through a digital media as e-Learning.

Video Podcast is equally favoured by both the students and teachers at UCN. For students it is a useful technological tool which helping gathering knowledge and for the teacher it is a sufficient supplementary tool which providing solutions to the difficulties of e-Learning. When integrating Video Podcast it is a complex process not only involving the injection of the technology. It is a learning process where activities are also a learning tool when trying to figure out what to do and what not to do when applying Video Podcast in e-Learning. The practices of the UCN and the teachers are embedded and hard to change, and there for some of the challenges met, might occur.

What was discovered during the investigation is the following:

As the Video Podcast is a new tool, it has its own difficulties, which is mainly experienced by the teachers who are working with the tool. These challenges can be overcome by spending time with the Video Podcast and gather more experience with it. The integration of the technology is slow but steady as the teachers are open to the use of the new tool.

The deeper challenges are occurring at UCN because of e-Learning. By the characteristics of e-Learning the teachers are not able to make connections with the online students. General feedback and communication is missing between the two subjects which led to challenges.

The nature of integrating Video Podcast in e-Learning education is gradually developing. E-Learning is a vast and still-shaping from of education. By the main characteristics of e-Learning, which is the distance learning and the requirement of excessive discipline from the students' side, e-Learning is a difficult education to transform for people whom not engaged with it before.

The investigation has shown that Video Podcast can affect the teacher ability to reach their learning ability. Students regard Video Podcast as a valuable media for obtaining knowledge, because they get material explained and the teacher has the possibility to emphasise what is important in the material to the teacher. The teachers also express the positive abilities of Video Podcast. Though the technology demands a level of experience and familiarity to be able to harvest the benefits, the teachers are optimistic about the integration of Video Podcast in the e-Learning programme. The Video Podcast affects their ability to reach their learning objectives by accommodating some of the challenges the teachers encounter when teaching through e-Learning.