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# Knowledge Sharing, Change and Implementation of ICT in Education in a University

Herman Schimmel

Thesis submitted in partial fulfilment of the  
requirements for the award of the degree of  
Doctor of Philosophy of Sheffield Hallam University

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## Abstract

This thesis explores processes of knowledge management in a Dutch university, focusing on the development of knowledge to support the transformation of education with ICT, and more specifically to enhance the pedagogical use of ICT. The study explores the factors that hindered and facilitated the development of a knowledge network of ICT coaches to develop such knowledge.

The study draws on theories and concepts relating to the transformation of education with ICT, organisation structure and leadership, and the management of change in universities. Particular attention is given to the social construction of knowledge within communities of practice and knowledge networks.

A mixed method approach was chosen for this single-university case study in which constructivist and positivist methods were combined. The quantitative methods encompassed a baseline survey, a density analysis of the social network, and a virtual community analysis. Individual and focus group interviews were used as qualitative methods.

A number of factors were identified which influenced why the ICT coach network did not develop in the way that was originally intended by the university. The coaches perceived too little or no management support and some coaches were inappropriately chosen as participants in the network. The findings showed that the ICT coach network was not a community of practice, and the development of the knowledge network was hindered by inadequate communication and social interaction. The ICT coaches in this case study showed a preference for face-to-face communication above the use of a virtual environment, and the coaches mainly had an instrumental rather than pedagogical focus towards the use of ICT in education.

A change model for the implementation of ICT in education was developed from the findings. This model presents knowledge as a key determinant of attitudes and behaviour. The social construction of knowledge in networks, based on prior knowledge and practice-based knowledge makes it possible to evaluate this knowledge and determine a person's negative or positive attitude towards and instrumental or pedagogical use of ICT in education. The model suggests that in order to change the behaviour of teachers in the use of ICT in education, teachers need to develop a knowledge domain about the pedagogical use of ICT in such a way that it will change their beliefs in a positive way.

A number of implications are identified for universities when considering the professional development of teachers in the use of ICT and learning.

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# Dedication

To my late parents Leendert Johannes Schimmel and Maria de Ruiter

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## Author's declaration

The work submitted in this thesis is the result of my own work, except when otherwise stated.

Any errors or inconsistencies that appear in the thesis are those of the author. This thesis has not and is not being submitted for any other comparable academic award.

Herman Schimmel

Signature



1 June, 2013

# CHAPTER 1

## Introduction to the research

### 1.1. Introduction

This thesis is about knowledge management in higher education, more specifically about the objectives of a Dutch university to use a teachers' network to develop knowledge about the use of Information and Communication Technology (ICT) as a key element in pedagogy, and to share this knowledge within the network creating new knowledge in order to enhance the use of ICT in education. To make the name of this university anonymous, the name Otto University is used. This first chapter will provide an overview and comprehensive introduction to the research and the context of the case study. The chapter will highlight the main theorists who have contributed to the framework of the study. The chapter ends with a brief outline of this thesis.

With the introduction of ICT in the workplace in the last twenty-five years, the way we work and learn has considerably changed. We can contact people almost any time and any place we want. Most of us are able to find a diverse range of information on the Internet. The rapid change in the use of ICT in daily life has also influenced approaches to teaching in higher education. Conventional teaching has emphasised content; courses were written around textbooks (Oliver, 2002), but today learning is supported by the widespread availability of ICT. This has had an impact on how, when and where students learn and the way teachers teach. In a strategic plan of the Dutch Surf Foundation (SURF, 2006) it was argued that digitally-facilitated education places new demands on teachers who must use integrated digital teaching systems for blended learning. Such teachers need training, not only in ICT skills, but also in the pedagogical use of ICT in education.

### 1.2. ICT and change in teaching and learning in higher education

Students today own a variety of information and communication technologies and almost every minute of the day they are connected online to friends via Facebook, You Tube and other Internet-based social networks. For young

people, the use of computers and the Internet is like breathing oxygen or like getting water from the tap (Oblinger, 2005). A recent study of the use of ICT by students shows that the choice of a student's academic major is associated with perceived skills in certain IT applications and his or her reported preference for technology in courses (Smith et al, 2009:7). Students today have been raised with computers and cannot imagine a life without them while a lot of older people still prefer the use of pencil and paper to write. Those people are what Prensky (2001) refers to as "Digital Immigrants". Most teachers were not raised with computers and that means that teachers have to shift their view of teaching. The use of ICT in education requires teachers to interact in different ways with their students (Ramsden, 1998:18). For this reason a lot of universities have taken measures to enhance the use of ICT inside and outside the classroom. However it takes time to transform education from a traditional way of transmitting knowledge from teachers to students to a more ICT-integrated educational system where students find their own way and the teacher becomes a mentor and advisor (Shephard, 2004).

Those responsible for the implementation of learning technology in higher education need to engage with stakeholders to determine where and what technology should be used (Ellaway et al, 2006). A study by Cousin et al (2004) revealed that there can be no blueprint approach to the implementation of e-learning because of the different cultures and institutional forces at play in universities. The implementation of learning technology applications has made it necessary for universities to develop activities and programs to help teachers to acquire skills in the use of such technologies. Introduction of the use of ICT in education also has made it necessary to develop strategies for a change in the pedagogy in which ICT is an integrated part of the curriculum. Simons (2001) argued that digital pedagogy was relatively new for teachers and that it could be a useful addition to subject-related pedagogy. Teachers must take the role of domain expert, coaching students to become active participants within the practice of their subject (de Laat et al, 2006: 107). For most teachers this was a paradigm shift and initiatives were taken for professional development of teachers in the use of ICT. Sharing knowledge



about the use of ICT in education and interaction between teachers is an important means of gaining knowledge (Kwakman, 1998, 2003). Recent research from Kemper (2011) showed that teachers will share more knowledge when they get more support from the organisation, receive more feedback from colleagues and managers, and are satisfied with ICT infrastructure. In a study by Weistra (2005) it was found that 90% of the teachers in Dutch universities use ICT in education and that 65% of them are positive about the usefulness of ICT. A distinction can be made between the technical use of ICT, that is where teachers know how to use e-learning environments and ICT application, and a pedagogical use of ICT where teachers integrate ICT into their curriculum. However is higher education ready to offer a curriculum that is based on the use of ICT?

### **1.3. The role of ICT in education in The Netherlands**

The attitude towards the usefulness and ease of use of ICT in education are important factors for teachers to determine whether they will change their teaching practice (Weistra, 2005). The Surf Foundation, a Dutch national organisation, developed a strategy for the implementation of ICT in higher education. 99 percent of the Dutch higher educational institutes are members of SURF (Boezeroy et al, 2007). In a strategic paper “Thinking Ahead” (Surf Foundation, 2006) a vision of the role of ICT in education was developed. It was argued that flexible and digitally-facilitated education required new skills of teachers. Higher education institutes were advised to develop integrated digital teaching systems for blended learning. The possibility of interaction among students and between students and teachers is an important condition for the development of digital teaching systems for blended learning. The strategic plan of the Surf Foundation also emphasised the condition of such a system for monitoring, testing and feedback on the progression of the student. Instrumental training for teachers in how to use ICT is needed, but training in the pedagogical use of ICT is needed too. To develop ICT in education teachers expect a flexible, integrated and digitally-facilitated teaching system and sufficient training facilities for educational innovation. In a scenario for the Surf Foundation, Liebrand et al (2009) questioned whether students in the year 2020 will still be dependent on the ICT infrastructure of

the educational institute or that they will be able to choose their own way of working and use their own facilities. Will universities still invest in digital learning environments? A policy paper about the use of ICT in education (Otto University Document 4, 2008) showed that teachers felt uncertain about the use of an e-learning environment and that more professional development of the teacher was needed. In 2008 the Ministry of Education in the Netherlands initiated programs that stimulated increased use of digital learning material in education. These public platforms with digital learning materials were easily accessible for teachers ( Ten Brummelhuis and Wijngaards, 2010). A range of programs was initiated to stimulate the use of digital learning platforms and digital learning environments for teachers. Surf Foundation initiated more than 20 projects to enhance the use of ICT in education <http://www.surf.nl> (assessed July 2012) and the projects were used by more than 22,000 teachers from universities and 'hogescholen'. In the Netherlands, as in Germany, there is a difference between universities and "Hogescholen". A university offers education that focuses on subjects with a scientific orientation and research. A "Hogeschool" offers education that is orientated on more practice based vocational training. Because this distinction is not made in some other countries in 2008 the Dutch Government decided to speak of Universities of Applied Sciences where a "Hogeschool" is meant. This thesis is about Otto University, a University of Applied Sciences in the Netherlands, where a project was started to change the use of ICT in education with the help of ICT coaches.

#### **1.4. Otto University**

Otto University is a University of Applied Sciences that offers courses in the domains of education, a wide range of social studies, business administration, Information and Communication Technology, Economics, Engineering. Students are offered a range of Bachelors and Masters courses. The university educates over 30,000 students in two campuses that are located about 15 miles from each other. The Executive Board of Otto University wrote an overall strategic plan for the period 2004-2008 (Otto University Document 1, 2004). The two main objectives of the university were to rank itself among the top three universities of applied sciences in the Netherlands, and to

develop the university to be the most important educational institute and knowledge partner in the region. The university aimed to focus on competency based education in order to meet the requirements of the companies and organisations in the region where the university is located. The strategic plan underpinned the importance of ICT: *“The growing influence of ICT in our life and in education makes it important to guide students in finding, selecting, and processing information”* (Otto University Document 1, 2004:9). In a strategic note (Otto University Document 2, 2004, translated from Dutch) the authors stated that e-learning environments, online communication, digital portfolios, and digital assessments are necessary to develop a more flexible and competency-based education. The education of students too should fit into the experiences and perceptions of the environments in which the students live.

With this in mind Otto University launched a strategy to change the educational and organizational framework with the basic premise that students are responsible for their own learning processes. The university offers students courses that are tuned to the individual objectives of the students, and focuses on the students to match their needs with the expectations and needs of the vocational practice in society. In western society today we live in an age where we no longer focus on the production of goods alone but also we emphasize the knowledge, which people possess, and their contribution to the objectives of the organisation. In this knowledge society (Wigg, 1997) more applied vocational knowledge is now needed in college and universities. Where the apprentice in past ages learned his job, skills and craftsmanship in guilds and from masters, now learning to master specific knowledge in a profession is in the hands of these universities. Therefore Otto University developed a strategy to move from being just an educational institute to a regional knowledge partner with a broad variety of courses, educational forms, training, and research in applied sciences. Offering education that is self-organised and self-planned by students changes the role of the teacher. The teacher must serve as a moderator, a facilitator and a coach for the student. To encourage teachers to become proficient in the new technologies and ‘keep up’ with the students, the Educational

Service Centre of Otto University took the initiative to train teachers in the use of ICT in education.

Such a scenario implies the use of a blended approach, where on the one hand online activities are used and on the other hand face-to-face meetings are held with students and tutors. It is the task of the teacher to create learning environments which motivate students and to facilitate activities that generate meaningful and worthwhile learning. *“The teacher who designs the right balance and blend of collaborative and individual learning activities is the key ingredient”* (Garrison and Anderson, 2003:24). It was argued in this university that teachers, administrators, IT-specialists and even students should work together to exchange knowledge and experience and learn to speak the same language so that educators can ask the right questions to ICT specialists to develop ICT in education (Otto University Document 2, 2004).

The growing use of technology also has its effect on the way e-learning environments are built and thus also affects the way teachers involve ICT and e-learning in their curriculum. Being in the middle of a change process to enhance the use of ICT and e-learning in the educational system, the university tried to make this change process happen by creating awareness through some early use of ICT and learning. Faculty Management asked teachers, and some learning technologists with a more than average knowledge of the instrumental use of computers to become ICT coaches. Faculty Management of each faculty was responsible for the appointment of ICT coaches in their faculty, responsible for assignments, roster and support of the ICT coaches. The main task of the ICT coaches was to bring the teachers at the university to a higher level in which they used computers to design the structure of their educational process.

The Educational Service Centre (ESC) of Otto University aimed to guarantee and stimulate good quality of ICT in education. The department did this by developing and supporting training in the field of learning & ICT within the university. In 2006 a small group of staff members from ESC formed a Network Managing Group (NMG) and started a network of ICT coaches. This network was established to create more awareness of learning and ICT among

teachers. ICT coaches gave training to colleagues in the use of ICT in education. The diagram below gives an overview of the place of the Educational Service Centre, The Network Managing Group and the ICT coaches within the University.

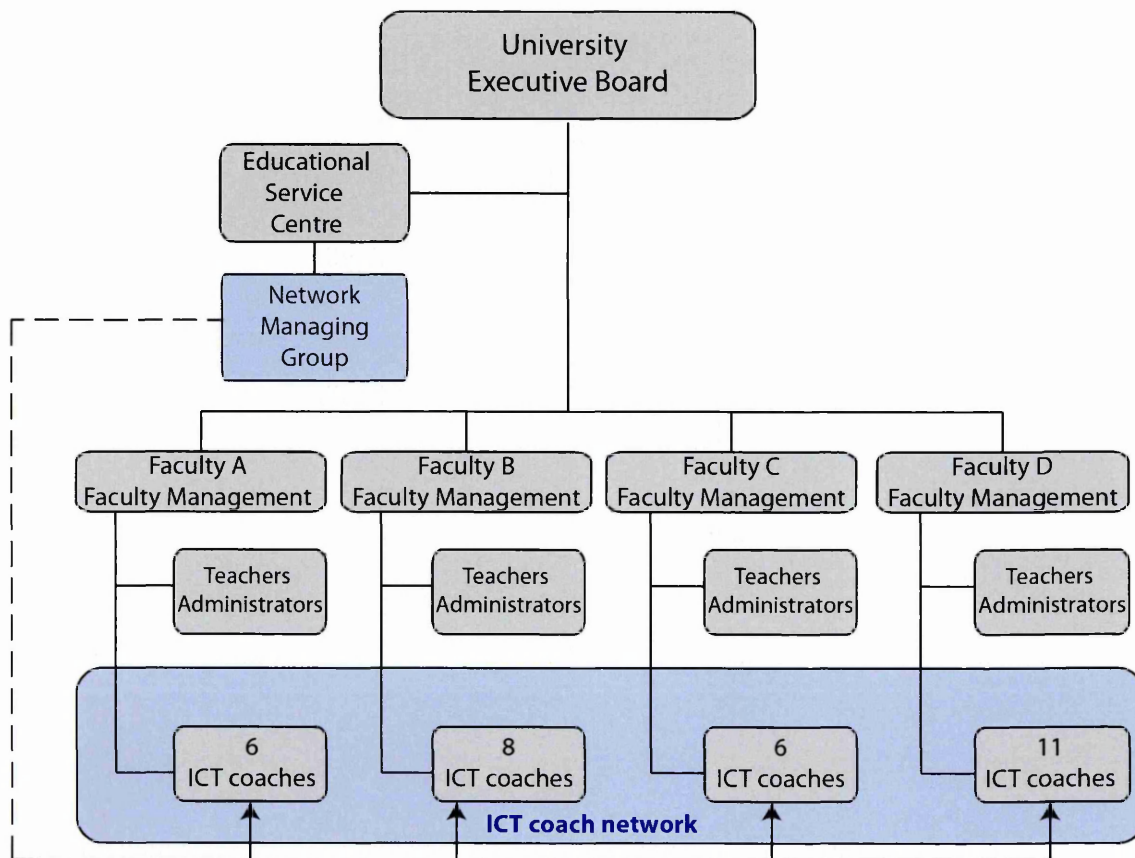


Figure 1: The organisation of the ICT coach network, Otto University, 2006

Coaches specialised in different ICT applications such as the new e-learning environment, digital portfolios, Student Information System and Digital Assessment tools. The knowledge of the ICT coaches was brought together in a network. Knowledge sharing was one of the main objectives of the network. In 2006 the university also decided to transform the whole university from the e-learning environment Blackboard to a new e-learning environment which was developed in the university and based on Microsoft Sharepoint. At the same time a new Student Information System (SIS) was introduced and two faculties started to use Digital Portfolios. All ICT coaches were trained in the use of the new e-learning environment and the use of the Student Information System (SIS) which was launched in the same period.

The main objective of the Network Managing Group (NMG) was to establish the network of ICT coaches and to support these ICT coaches with advice and training material. The NMG consisted of three staff members, all educated in pedagogy, and was a part of the Educational Service Centre at the university. The NMG organised 4 -6 meetings per year to discuss pedagogical themes around ICT and learning. In each faculty ICT coaches were appointed to train the teachers in the university in the use of ICT in their teaching practice. In a manual (Otto University Document 5, 2005) the main objectives of this training were described:

- Teachers have knowledge how to use ICT in their teaching practice.
- Teachers have a positive attitude in the use of ICT in education.
- After the training teachers should independently be able to develop the use of ICT in their teaching practice.

A training plan was written (Otto University Document 3, 2005) to meet the requirements of teachers to work with ICT in their daily practice, and to transform the teachers to work in a curriculum with a fully integrated ICT component.

*The ICT coaches are important to support the training in the institutes of the university. They are the linking pin between the demand of the institutes and the offer of the Educational Service Centre. A systematic and coherent support can only be given by the effort of the ICT coaches.....With a strong support of the ICT coaches the institutes will benefit. Commitment from the institutes to the work of the ICT coaches is paramount.*

Otto University Document 3, 2004:10

Otto University (Otto University Document 2, 2004:23) identified five requirements for the use of ICT in education: ICT should enhance meaningful learning, authentic learning, integrated learning, social learning and active and reflective learning.

Otto University had a strategy that teachers should have enough ICT skills and should show a positive attitude towards the use of digital resources. The aim was to train teachers in the integration of ICT into education, not only in how to use ICT applications.

The plan was based on the educational vision displayed in the Otto University Document 2 (2004), which was derived from the E-learning Excellence Model of van Hooff (2003) (figure 2). The maturity levels of van Hooff build on the maturity levels articulated by Rieber & Welliver (1989) and Itzkan (1994) to define stages in the level of computer use in the development of education. These models are described in section 2.4.1 of this thesis.

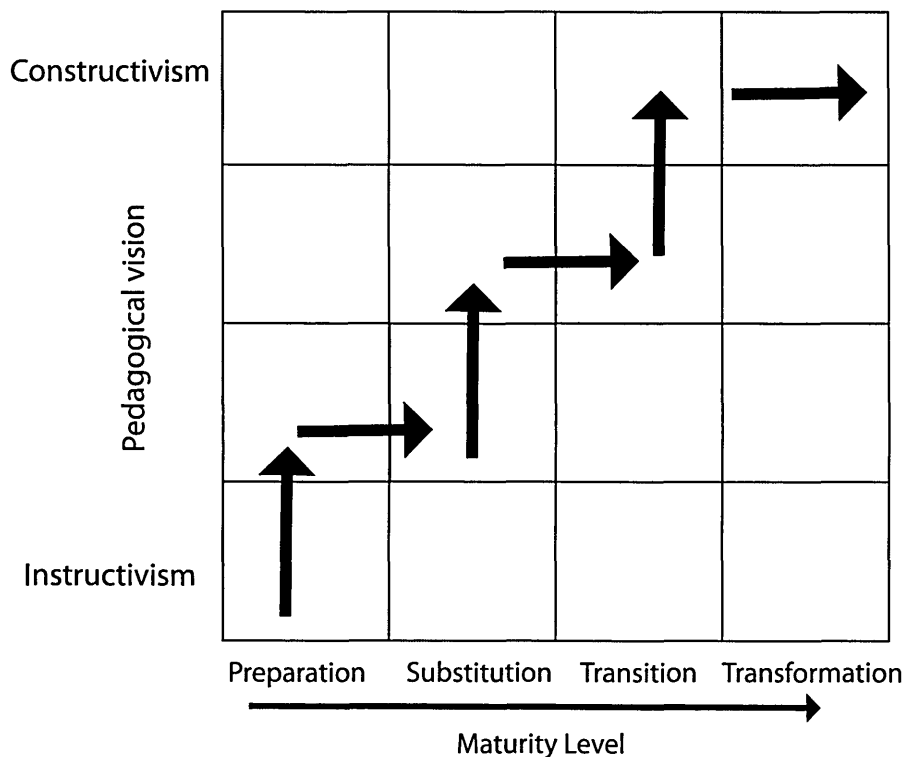


Figure 2: E-learning Excellence Model, Otto University, 2005

In these maturity levels the level of ICT in education goes from a Preparation level, where no ICT is integrated, to a fully integrated level of ICT in which teachers have pedagogically-integrated ICT in their teaching. In their view, teachers should go through these maturity levels to grow to flexible and competency-based education (Otto University Document 3, 2005:12).

The training was planned to cover four levels. The levels were:

Maturity level 1: Preparation and skills training. The main objective of this first level was to teach teachers how to work with a certain ICT application. The teachers learn basic skills to start to use the applications in an instrumental way. The training was designed around an ICT application and not around the work field of the teacher.

Maturity level 2: Substitution. This training was designed around the role of the teacher. The objective was to make the teacher digitally competent to integrate ICT in the curriculum.

Maturity level 3: Transition. In this level the teacher is digitally competent and learns how to share his knowledge with colleagues and disseminate and advocate the use of ICT in learning.

Both levels 2 and 3 were aimed at the same teachers but in level 3 training the focus was on different aspects. Four ways of using ICT were built into the third training component. Firstly teachers were trained on how to moderate the process and guiding of students in a digital environment. Furthermore, it was aimed to train them in the use of a digital assessment application. Secondly curriculum developers were trained to “*develop digital learning objects based on new digital pedagogical competences*” (Otto University Document 3, 2005:22). Thirdly it was aimed to train assessors how to use a digital portfolio and how to develop digital assessments. The fourth way was for the student mentor. Mentors should not only learn how to use a digital portfolio but also how to link the course catalogue and the portfolio to guide and advise students to choose the right education.

Maturity level 4: Transformation. In level 4, the ICT coaches were to be trained. The role of the coach was to give pedagogical support to teachers in the development of ICT in education. The ICT coaches were supposed to be a linking pin between the needs of the institutes and the training that the NMG could offer. In the handbook, which was provided by the NMG, the ICT coaches were described as ‘the antenna’ of the NMG. In response to what they experienced they could react on the demand of the institutes.



## 1.5. Aim of the study

In the previous sections we have seen that universities need to develop activities for the implementation of e-learning and the change of pedagogy with the use of ICT. Teachers have to be trained in their new role as domain expert, coach and mentor of students. Knowledge about the domain of ICT in education has to be shared in order to create a positive attitude to the usefulness of ICT in education if behaviour is to change. The aim of this study was to explore the development of knowledge, attitude and behaviour of teachers who are tasked with supporting changes of pedagogy with the use of ICT in higher education. In order to investigate this, a group of teachers in the Netherlands, who were appointed as ICT coaches to train their colleagues in the use of ICT in education, was followed for three years. The study examined the role of face-to-face and virtual networking in the development of the knowledge of these coaches about the use of ICT in education. The difference between those networks was investigated in terms of their potential effects on knowledge sharing and knowledge creation. The research has explored how this knowledge in the domain of ICT and learning was shared and created in the university.

The objective to change pedagogy with the use of ICT in higher education made it worthwhile to explore the perceptions of the ICT coaches about the role of leadership and management in this university. From that perspective, the literature of initiating and leading change in universities was explored. The ICT coaches were brought together in a network and the aim of the university was to create a community of practice. Structural elements and characteristics of both communities of practice and networks were analysed in relation to the ICT-coach network in this university. The original aim of the study was to explore knowledge creation and sharing aimed at a change in pedagogy in higher education. More specifically, the role that the ICT coaches played in the development of knowledge through networking, both virtually and face-to-face, was examined. This research draws on existing literature in social constructivism (Vygotsky 1978), the practice-based perspective of Knowledge Management (McElroy, 2003, Hislop, 2005), Communities of

Practice (Wenger, 1998), and the Model of Reasoned Action from Fishbein and Ajzen (1975, 2005, 2010).

The main research question was:

**“What is the role of face to face and virtual networking in relation to creating and sharing knowledge for the development of ICT use in teaching?”**

Within the specific context of this study the following additional questions were considered:

- How does the knowledge of the ICT coach develop in face-to-face and virtual networks with regard to the use of ICT in teaching?
- How does the practice of the ICT coach develop in face-to-face and virtual networks with regard to the use of ICT in teaching?
- How is knowledge created and shared with regard to the use of ICT in teaching?

The objective of the network was that the ICT coaches use their shared and created knowledge to train their colleagues in the use of ICT in their teaching practice. However the findings of the study showed that not much knowledge sharing and exchange of practices about the use of ICT took place during the three years of investigation. In order to make a contribution to knowledge about educational change in higher education with the use of ICT the focus of the analysis was on the factors that determine the development of knowledge networks. The research question was rephrased to:

***“ What factors facilitate and hinder the development of knowledge networks in the development of ICT use in teaching in an organisation such as this one?”***

In section 8.2. a more detailed consideration for this is given. A similar case of such networking by ICT coaches was not found in the Netherlands and this thesis aims to build on knowledge in the field of ICT and learning and the field of educational change in higher education.

## **1.7. Research Design**

In this research a mixed method approach was taken. For an in-depth exploration of the context of the ICT coach network, the research was set up as a case study. A baseline survey, a density analysis of the ICT coach network and an analysis of the virtual network were used as quantitative methods. Qualitative methods were face-to-face interviews with the ICT coaches and members of the NMG, focus group interviews with ICT coaches and the field notes of meetings attended.

### **First Stage**

A baseline survey was undertaken at the start of the research. The objective of this survey was to describe the current status of knowledge, attitude and behaviour of teachers and ICT coaches with respect to ICT and learning. Besides their practical knowledge about ICT and learning, the survey investigated the use of knowledge resources about ICT and the motivation to use ICT in their teaching practice. ICT coaches used the same questionnaire as the teachers; however six additional questions were asked about their motivation to participate and expectations from their participation in the ICT-coach network.

### **Second Stage**

Semi-structured interviews were held with 31 ICT coaches who were active in the network at that time. The interviews formed the main part of the data collection in this study. The aim of the interviews was to answer the main original research questions. At the end of each interview a density analysis of each ICT coach's relationships was made to map how actively the respondents were involved in the discourse and the level of engagement in the network. During this second stage seven face-to-face meetings between ICT coaches were attended to obtain knowledge about the network, about the issues discussed, and about the attendance of the coaches.

### **Third Stage**

The goal of the third stage was to identify the development of the knowledge, attitude and behaviour of the ICT coaches with regard to the creation and sharing of knowledge in the network between the time the interviews were

held and the time of the focus group interviews. To do this, focus group interviews were held in each of the four faculties of the university and with the staff of the Network Managing Group.

#### **Fourth Stage**

In the interviews and focus group interviews, coaches stated their contribution and activity in the virtual network. During the academic year of 2008/2009 this virtual network of the ICT coaches was analysed in order to measure the activity level of the coaches and to value their activity in relation to their statements in the interviews and focus group interviews.

### **1.8. Outline of the thesis**

This thesis consists of ten chapters.

Chapters 2 and 3 contain the literature review. Chapter two explores the transformation of education with the use of ICT in general and in the Netherlands. The literature is discussed in relationship with the organisational structure of universities and managing and leading change.

In chapter 3 the creation and sharing of knowledge from a social constructivist perspective is explained. Furthermore, theories of knowledge management and communities of practice are explored in relationship to this epistemology. Networks and communities are defined and analysed and consideration is given to the main differences between face-to-face and virtual networking.

Chapter 4 describes the design and procedures of this case study, and the methodology and methods that were used. The strengths and weaknesses of the approach are explored.

Chapters 5, 6 and 7 describe the findings of the study. Chapter 5 describes the results of the baseline survey, which was used to explore the current state of the use of ICT in the university. Chapter 6 describes the findings of qualitative methods that were used: the personal interviews, reflections on the field notes made from the meetings of the coaches, and the focus-group interviews.

Chapter 7 explores the results of the quantitative methods used, namely a density analysis of the network of the ICT coaches and an analysis of the virtual network of the ICT coaches.

Chapter 8 discusses the themes that emerged from the analysis of the data. Seven themes were found that are important in the development of this network of ICT coaches.

In chapter 9 the concept of double-loop learning is used to develop a model for the change in the use of ICT in education. In the final section in this chapter, preconditions for a knowledge network to change education with ICT are discussed.

Chapter 10 gives a comprehensive discussion, bringing together the theoretical framework and all the findings in this research. This chapter also gives an answer to the original research questions.

## CHAPTER 2

# Transforming education in universities through the use of ICT.

### 2.1. Introduction

This case study is about how a university is changing and innovating education with the help of Information and Communication Technology (ICT). The university wishes to transform education through the use of ICT. E-learning is seen as a new paradigm of modern education and has influenced the organizational structure of universities and the workplace of teachers and students (Wang, 2011:191). This chapter will explore what the implications of this transformation are for the professional development of university teachers in the use of ICT, and in Dutch higher education in particular. Furthermore the organizational structure of universities is explored and how change in universities can be managed.

### 2.2. Transforming education with ICT

In the last decade, the role of the student in higher education has changed. From passive reception of knowledge in classroom-based lectures, students are now confronted with digital learning where they are offered asynchronous work as individuals or in groups. Asynchronous working in online environments gives students an opportunity to combine education with work, family and other commitments and students are stimulated to learn in peer-to-peer settings either face-to-face or online (Hrastinski, 2008:52). Ramsden (2008:4) suggests that university students see ICT as a complement to face-to-face interaction. One of the aims of using ICT to support learning is that students are expected to develop autonomous learning, to be capable of self-planned self-management and also to be able to self-assess their own learning (Peters, 2000:10). Oblinger (2005) argues that for the present generation of students, the *Net Generation*, the Internet is like oxygen: they can't imagine being able to live without it. These students are positive about the use of ICT in learning; however it takes time to introduce higher education students to

online environments and they may experience frustration about how to develop patterns of study and activity (Sharpe and Benfield, 2005:6).

This changing paradigm has implications for the university teacher. The introduction of ICT into the university has meant that university teachers have been expected to develop new ways of teaching. Prensky (2001:3) describes teachers as “*Digital Immigrant Teachers who assume that learners are the same as they have always been*”, using the same methods as they themselves have used. Molenaar (2005) states that there is already a generation gap between people from 30 years and younger and the older generation because of the use of new technology. Ramsey (2007: 31) notes that learning is a change of relations between tutor and student; the control of learning is no longer in the hands of the tutor but it becomes a more student-tutor relation where they learn together. The role of the teacher has been identified as changing from transmitter of knowledge to that of facilitator, mentor, advisor, counsellor and designer of learning (Jones and Lau, 2009, Peters, 2000; de Laat, 2006, De Laat 2006a, Koper, 2000). Stijnen (2003:44) argues that this change has often brought resistance in teachers because they perceive that their role of transmitting specific knowledge in their domain was put into another perspective. Teachers have chosen to be a teacher in the first place because of the knowledge they have in that specific domain.

The introduction of ICT into the workplace and the implementation of e-learning are probably the most radical changes in the last twenty years in higher education. Working in online environments has made tutors aware of their new role. Peters (2000:12) suggests that ICT offers opportunities for autonomous learning and that hypertext is a convincing vehicle for such autonomous learning. The document ‘One World, One School’ (Vision 2020 Executive, 2000:8) suggests that the curriculum in higher education should be more creative, and aim at developing skills of analysis, critical thinking, problem solving and group collaboration. It also suggests that students should negotiate with their teachers on the curriculum they should follow. To facilitate this, higher education institutions have developed the use of e-

learning in the last twenty years and this has had an impact on the student-teacher relationship.

Adams and Morgan (2007) suggest that 'first-generation' e-learning was mainly technology driven with a major role for the teacher as instructor, and theory and practice were separated. In 'second generation' e-learning the environment is more pedagogy-driven, learning is more flexible and knowledge creation and knowledge sharing are integrated more in the curriculum. Collis and Moonen (2002:217) distinguish four components of flexible learning: technology, pedagogy, implementation and institution. By the technology component the authors mean a combination of the use of information and communication technologies. The component *pedagogy* is defined as

*...the art and science of teaching, the knowledge and skills that practitioners of the profession of teaching employ in performing their duties of facilitating desired learnings in others.*

*De Boer and Collis (2002: 88)*

In relation to the use of ICT in teaching, Collis and Moonen (2002) define the term pedagogy as

*... the manner in which the teaching and learning processes and settings in a course is organized and implemented by an instructor.*

*Collis and Moonen (2002: 224).*

Collis and Moonen (ibid) state that the pedagogical component has to be implemented in practice with the use of new technologies. Pedagogy is seen as a critical component to move forward to flexible learning in an institution. The institutional framework refers to the professional climate of the institute, the management style of its leaders, experiences with technology-related change and the vision of the leaders and key persons to change the education with ICT (Collis and Moonen, 2002: 228)

These four components; technology, pedagogy, implementation and institution, are present in the underlying case study. Transformation of the



pedagogy through the use of technology was one of the objectives of the ICT coach network. Implementation of ICT applications in Otto University was another important objective of this network. To enhance the implementation of ICT in teaching practice, a training program for the professional development of teachers was set up.

With the introduction of ICT in the classroom in the last fifteen years, many initiatives have been taken for the professional development of teachers in higher education. The next section describes the role of learning technologists in helping teachers to use ICT in their teaching practice.

### **2.3. Professional development in the use of ICT in education**

When the Dearing Report was published in 1997 (NCIHE 1997) a wide-range of efforts in education in the UK were started to implement learning technologies in a useful way (Brown and Currier, 2001). Traditionally in HE, there have been only two categories of staff: ‘academics’ and everyone else (Gornall, 1999:44). In many cases the introduction of new technology was put in the hands of non-academics. In the Dearing Report (NCI HE 1997) the term ‘support staff’ arose, a general term for non-teaching staff. Most of them were employed in roles clustered around changing forms of support for teaching and learning (Gornall, 1999: 45), and were given names ranging from Flexible Learning Coordinator to Distance Learning Officer, and from Project Teaching Tutor to Project Officer. Many authors (Oliver, 2002; Browne and Beetham, 2010; Gornall, 2009; Shurville et al, 2009; McPherson et al, 2004) described the roles of these ‘learning technologists’. The Association for Learning Technology (<http://www.alt.ac.uk/about-alt/what-learning-technology>) define learning technologists as people “*who are actively involved in managing, researching, supporting or enabling learning with the use of learning technology*”. Oliver (2002:246) distinguishes three groups of Learning Technologist: 1) New specialists who tend to be multiskilled and peripatetic, but with learning technologies as the core of their professional identity; 2) Academics and established professionals who have incorporated an interest in or formal responsibility for learning technologies into their

existing professional identity; 3) Learning support professionals who are staff in non-academic roles (including technical support and library professionals).

The learning technologists support teachers by introducing them to the new technologies in education. These 'new professionals', as Gornall (1999) named them, were involved in ad-hoc and unassessed tutoring (or training) to staff and/or students. A survey by Browne et al (2008) found Technology Enhanced Learning (TEL) to be provided by a wide range of units, mostly by a technical support unit and in a lower degree by an educational development unit. It was found that post-92 institutions in the UK have larger Educational Development Units with greater numbers of academically-oriented support staff.

The question of how learning support should be organized is discussed by Browne and Beetham (2010) who argue that

*...educational technology staff could be regarded as pioneers of a new way of working: team-based, project- or problem-focused, multi-dimensional, collaborative, inter-disciplinary, and with a focus on the student experience and learning journey rather than on the curriculum, though with strong links to academic curriculum teams to whom they become a source of expertise.*

Browne, and Beetham (2010:15)

McPherson and Nunes (2004) identify four main types of roles for educational technologists: a pedagogical role, which focuses on guiding learners in discussions and developing critical concepts; a social role, which involves the creation of social environments; a managerial role, which includes setting of learning objectives and establishing agendas for learning activities; and a technical role, which involves the familiarisation and enhancement of skills with the ICT systems. Shephard (2004:67) writes that professional development of staff involves a dichotomy between helping teachers to develop and use learning resources and helping them to develop skills which are needed to find, develop and use these learning resources. Hudson (2009: 212) states that academics and practitioners struggle over job titles of learning technologists, and struggle with the scope of work in order to

establish identity. She argues that, in contrast to other academics, there is little sense of belonging to an overall culture or academic discipline.

It is necessary for institutions to establish a framework within which educational technologists can flourish to overcome the barriers to successful deployment of Technology Enhanced Learning (Browne and Beetham, 2010:8). Structural changes can only be made by staff with a long term and secure status within the institute (Browne and Beetham, 2010:7).

Duderstadt et al (2003) give a number of recommendations to help leaders shape a strategy on the use of technology. These recognize the fact that the rapid evolution of information and communication technology will stimulate strategic transformation in their institutions. It is recommended not to delegate these important issues to faculty committees or chief information officers. In their opinion transformation should come from the president and the provost. Staff with responsibility to change the use of ICT in universities thus need to understand the unique features of digital technology and how these affect people in their activities. Faculty roles and work patterns are changing and teachers will place more emphasis on facilitating the learning process than on lecturing (Duderstadt et al 2003:51).

Shephard (2004:70) describes some phases in the professional development of teachers in the use of ICT in learning. It begins with becoming familiar with technology and creating some confidence in the use of ICT. It is important that teachers develop experience in a range of possibilities that e-learning provides, are aware of the amount of the resources that are available on the Internet, and are willing to experiment with them. After learning to use specific software, teachers need to understand the pedagogic model to be used. After learning how to use the programs and the Internet resources, teachers can develop their own e-learning resources and embed them in a learning program. Learning resources can be piloted with colleagues and students and after evaluation expanded to full use. Constant evaluation and constant updating of skills is necessary to improve the e-learning programs.

There are several groups which provide a combination of direct support and support for professional development of teachers. According to Shephard (2004:72) academic colleagues are often considered to provide the most reliable and independent direct support for training and development. However sometimes teachers struggle with their own needs and those of the organisation, particularly in academic institutions where research time for publications and time for teaching preparation and practice are competing interests (de Freitas and Oliver, 2005: 89). In the survey carried out by Browne et al (2008) about the enhancement of e-learning in UK universities, lack of time was identified as the main barrier to further developments to promote Technology Enhanced Learning TEL for all types of university.

In the Netherlands, the Ministry of Education (1992) distinguished three forms of ICT use as a part of the learning process: ICT as *object*, as *aspect* and as *medium*. As *object* ICT is seen as learning about information technology. *Aspect* refers to specific ICT applications that are used in education. The third form, *medium*, refers to ICT as tools for teaching and learning itself (Plomp et al, 1997). To start it is necessary to teach educators object knowledge of ICT, which is knowledge about the technical issues of ICT. In the first phase of exploring the technical issues of the use of ICT in education teachers use substitution to implement new technologies (Itzkan, 1994). After substitution of learning objects into digital environments, teachers need to understand how to use ICT in a pedagogical way, and transform their teaching in such a way that they develop their own learning resources. The transformation of the use of ICT in the Netherlands and how in particular this implementation was planned in the university in this study, is described in the next section.

#### **2.4. Transformation of education with ICT in the Netherlands**

In a report published in 1999 about the transformation of the use of ICT in higher education in the Netherlands, Geloven et al (1999) concluded that the major constraints for the implementation of ICT were the lack of time that university teachers have to make the shift to a new way of teaching, learn to work with ICT, and the development of the necessary pedagogical skills to teach with ICT. The report suggested that there seemed to be a gap between

strategic objectives of universities and the actual change of education in the workplace (Geloven et al, 1999) because not all strategic plans defined clear choices on how education should be transformed with the use of ICT. Collis and van der Wende (2002, p.8) identified three stages in the transformation of universities in the use of ICT. The first stage is the implementation of the technological infrastructure, the second stage is the pedagogical use of this infrastructure and the last and third stage is the strategic use of ICT for different target groups of higher education. Where many universities focus on their traditional target group (high school leavers) it is necessary in this third stage to develop policies that focus on different target groups (traditional and lifelong learners).

In a large university of Applied Sciences in the Netherlands, a study was carried out in order to identify whether the implementation of ICT was a problem for teachers (Verhoef, 2003). Verhoef (ibid, and translated from Dutch) states: *“Teachers work in isolation in their own course and they hardly take any notice of what is going on in other courses. They are hardly stimulated by their administrators and managers to work together with teachers from other courses”*. Verhoef (2003) also found that teachers experienced a lot of pressure in changing their teaching practice with the use of ICT. One of the reasons was that teachers in this new educational era had to work together with their colleagues. More community building in this respect was appreciated but sometimes this also led to confrontations and took a lot of time.

In first-generation e-learning, courses were built online and presented with classroom-based instructional content (Singh, 2003). However the need for universities to move from ‘first-generation’ e-learning (the substitution phase) to ‘second-generation’ e-learning (transformation phase) is necessary in order to innovate in pedagogy (Itzkan, 1994). According to Koper (2002) the innovation of education was mainly focused on the availability of a large number of computers and ICT infrastructure. Koper (2000: 2) says: *” I think that in education quite a lot of energy is wasted on chasing solutions that have everything to do with technical possibilities, and nothing to do with*

*fundamental renewal*”. The change from first-generation e-learning to a more integrated use of ICT in education demands a new role for the teachers. In their strategic plan ‘Thinking Ahead’ the Dutch SURF foundation (2007) stated that teacher training should not only focus on the enhancement of ICT skills but also needs pedagogical components on how to employ ICT in the curriculum of courses. Educational innovation projects were launched such as the Grassroots program ([www.surf.nl](http://www.surf.nl)) and websites such as “Good Practices” and “Digitale didactiek” ([www.digitaledidactiek.nl](http://www.digitaledidactiek.nl)). The objective of these programs was to improve the expertise of teachers in higher education.

The university in which this study is set had recognised that transforming higher education into more competence-based learning requires a new curriculum and a new way of teaching (Otto University Document 2, 2004). The authors of the University policy document argue that teaching of the competences should be based on the social-constructivist principles: knowledge is developed by the students themselves; knowledge is subjective; knowledge is developed in relation to the context that it is used for; knowledge is developed together; and knowledge should connect to personal meaning to sustain in long-term memory.

*Vocational practice is not the “serving-hatch” to pass on knowledge, but plays an active role in the development of knowledge, knowledge transfer and use of knowledge in the vocational context.*

Otto University Document 2 (2004:20)

To implement competence-based education, ICT is used to make teaching more flexible, to enhance peer-to-peer review and the communication between teacher and student. Learning should connect to the experience and context of the students (Otto University Document 2, 2004)

For the development of innovation in education Itzkan (1994) distinguished three maturity levels, which he called ‘*the three phases of change*’:

*Typically, the impact of a new technology will pass through three phases. These are (1) a substitution phase, (2) a transition phase,*

*and (3) a transformation phase. In the substitution phase, the technology replicates or automates existing practices. It does what people already know how to do, but better. It does not challenge existing paradigms. In the transition phase, new methodologies begin to evolve. The technology is now doing things that it wasn't necessary brought in to do and is challenging old models. In the transformation phase, the technology has created completely new methodologies and proven the old one obsolete. The task for which it was originally acquired, may no longer be desired.*

Itzkan (1994:62)

Itzkan (in Weistra, 2005) summarises the levels as: Substitution is new technology, Transition is new methodology and Transformation is a new paradigm. Weistra (2005,p 13) compares this model with the model of Instructional Transformation (Riber & Welliver, 1989). This model describes five stages that teachers go through: *Familiarization*: a teacher becomes familiar with computers; *Utilization*: the teacher uses computers in teaching; *Integration*: the computer has become critical to the teaching; *Reorientation*: the teacher pursues an expansion and fine-tuning of the computer-teacher-student relationship; *Evolution*: (more a suggestion than a condition) continue practising and learning about how to improve instruction through systematic implementation of computer technology. Weistra (2005) argues that the first stage of the Model of Instructional Transformation (familiarization) is written from the teachers' perspective and that the last stage (evolution) is not a real stage but more a reminder. He argues that the stages of Itzkan and the stages of the Model of Instructional Transformation show great similarities.

Model of Instructional Transformation	Phases of Change
<b>Utilization</b> <ul style="list-style-type: none"> <li>- Teacher tries out</li> <li>- If technology were taken away, hardly anyone would notice</li> </ul>	<b>Substitution</b> <ul style="list-style-type: none"> <li>- no interference in the structure of the educational process</li> </ul>
<b>Integration</b> <ul style="list-style-type: none"> <li>- Designate certain tasks and responsibilities to technology</li> <li>- If technology is unavailable, the teacher cannot proceed with the instruction as planned</li> </ul>	<b>Transition</b> <ul style="list-style-type: none"> <li>- ICT induces new didactics</li> <li>- With ICT processes are organized and performed in a different way</li> </ul>
<b>Reorientation</b> <ul style="list-style-type: none"> <li>- Reconceptualise the purpose and function of the classroom</li> <li>- The learner becomes subject rather than object of education</li> </ul>	<b>Transformation</b> <ul style="list-style-type: none"> <li>- An entirely new educational process</li> <li>- Student controls the own learning process.</li> </ul>

Table 1: Phases Model of instructional Transformation (Riber and Welliver, 1989), versus Phases of Change (Itzkan, 1994) - a comparison by Weistra (2005)

In order to integrate new technologies in education, the structure of universities must be ‘changeable’ and universities that are not willing or able to change their structure may face serious competition from other educational institutes such as virtual universities (Scott, 2000:102). In the next section the nature of organisational structure in universities is explored, and the factors which have to be considered when implementing educational change.

## 2.5. Organisation structure and leadership in universities

From the 1990s, the increasing number of students, commercialization of education and the increasing influence of the Internet increasingly influenced the way universities were managed (Jensen, 2010:10). Based on his research, Clark (2000) argues that universities are transforming from a traditional collegial university to an enterprising university, which resembles more a business model than the old model. In the old model, universities are strongly influenced by tradition while much of the research on organisational structure derives from industrial and commercial firms and is not necessarily applicable



to higher education (Hannan and Silver, 2000:77-8). Jensen (2009:13) states that a university, as a teaching institution has the characteristics of a professional bureaucracy (Mintzberg, 1983). Mintzberg defines a professional bureaucracy as a type of knowledge organisation with emphasis on authority of a professional nature, the '*power of expertise*'. In a professional bureaucracy highly-trained individual experts form the formal '*embrained knowledge*' of the organisation (Lam, 2000:494). The formal knowledge in such organisations forms an important basis of internal work rules, job boundaries and status (Lam, *ibid*). Examples of professional bureaucracies are universities, hospitals, lawyers' offices and insurance companies in which we may find parallel hierarchies, such as universities administration or university libraries (Jensen, 2009:14). Universities are often differentiated, complex organisations segmented into several subunits that isolate professionals from one another (de Lima, 2007:295)

Jensen (2009:8) states that Western European universities are mixed organisations (project organised and line/staff organised) and that those universities have 'organised anarchy' or are 'loosely coupled'. Weick (1976) introduced the concept of 'loosely coupled systems' by giving an example of a soccer match where the field is round, and there are several goals scattered around the field. In the game, every player can play as he wants, enter or leave the game whenever they want to and the player can claim the goal they want. The author suggests that if one replaces the referees into principals, the coaches into teachers and players into students the picture of an educational organisation can be imagined. The concept of an educational organisation as a loosely-coupled system is based on the question "What holds an educational organisation together?"

Glassman (1973, cited in Weick, 1976: 3) introduced the term 'loose coupling' and argued that coupled events are responsive, but also that each event keeps its own identity, its physical or logical separateness. Weick (1976:7) developed this concept stating that there are two most-discussed coupling mechanisms: the technical core of the organisation and the authority of office. He argues that the concept of loose coupling is not to be used

normatively. He gives seven potential functions which could be associated with loose coupling. These seven functions are:

1. Loose coupling allows parts of the organisation to persist. This may be the case in voting mechanisms, where officials remain in the office and are persevering in archaic traditions.
2. Loosely coupled systems preserve many independent elements, which have a better knowledge of their environment than more tightly coupled systems and therefore could induce more frequent changes in their activities.
3. Loosely coupled systems may be good for local adaptation. It allows one element to adjust to its local environment without affecting the whole system.
4. In loosely coupled systems the system can retain a greater number of mutations and innovations than in tightly coupled systems because they are better able to adapt to changes in the environment
5. The loss of one element in a loosely coupled system does not affect other parts in the organisation. However the downside is that problematic systems can be isolated.
6. In a loosely coupled system there is more room for self-determination by the actors in the system.
7. A loosely coupled system could be relatively inexpensive to run because it takes time and money to coordinate people. It seems that that lower coordination reduces conflicts and had fewer inconsistencies among activities. This could keep the costs of coordination lower than in a tightly coupled system.

Loose coupling is frequently said to be a characteristic of universities. At universities faculties, institutes and teachers often are not working together. Hargreaves (1994) calls this *balkanization*. Balkanized cultures have several characteristics: (1) balkanized teachers work individually or in their own sub-groups and their learning mostly occurs within the groups; (2) few teachers

move between groups and their membership is rather stable; (3) teachers have stable personal identification and it limits communication between staff; and (4) balkanized teachers distribute power and interest largely through their membership in the sub-groups (Hargreaves, 1994: 213-5).

Because of this balkanized structure it is often difficult to manage staff. Ramsden (1998, p.26) points to the difficulties of managing academic staff: *“managing academic staff has been likened more than once to a process of herding cats. Cats don’t need leaders. Experts perform best when left to their own devices”*. There seems to be a gap between strategic management and academics on the work floor, two different cultures in which academics don’t understand the management and vice versa. De Lima (2007: 273) states that universities are culturally heterogeneous organisations.

There may be a lack of respect for ‘administration’ combined with a lack of trust in ‘management’ in general (Whitchurch (2007:55), which does not always lead to common understanding between academic and management colleagues about what may be a valued local relationship. Both are working in the same organisation but have no knowledge and understanding of the work and objectives of the work of the other units (Reponen, 1999:241). Ramsden (1998:27) writes that management in academic institutions has problems with academics because of poor departmental and institutional cohesion, because of marginal loyalty to work unit and university and the lack of entrepreneurial spirit. On the other hand academics feel that their individual needs are ignored and that management interferes with the right to work autonomously. Universities are expert and knowledge-intensive organisations, which can easily revert to becoming a total of many loose autonomous units (Reponen, *ibid*).

In research among 12 UK universities, Bolden et al (2009) found that each institution in those universities developed its own structures and that the structure of HE institutions is not generally suited to managerialism or ‘top-down’ leadership. The findings from their study were that the term ‘distributed leadership’ is accepted in HE but that respondents gave a wide variety of interpretations of the ways in which leadership is actually

distributed. In their research Bolden et al (2009:268) found that managers and academics in the UK experienced various forms of leadership in HE such as dislocated, disconnected, disengaged, dissipated, distant and dysfunctional. The respondents in their research had a need for both top-down and bottom-up leadership. Bolden et al (2009:274) argue that there are two principle approaches for leadership. The first is 'devolved' leadership, which is associated with formal and intentional leadership with top-down influence; and second 'emerged' leadership, which is associated with informal and unplanned leadership with bottom-up and horizontal influence. De Freitas and Oliver (2005) state that top management often develops policy and strategy and propagates this throughout the whole organisation in order to change the organisation. On the other hand there are also bottom-up initiatives instigated by innovative practitioners in a rather uncoordinated way. However most organisations would benefit from a combined approach mixing top-down and bottom-up policy, strategy and activities, interacting and informing one another (De Freitas and Oliver, 2005:86). The way universities are organised and structured has to be considered when implementing educational change.

## **2.6. Managing and leading change in universities**

Salmon (2005:205) argues that academic staff are naturally reluctant to change. Academic staff, often do not want to change their method of teaching, are inexperienced in e-learning and initially believe that the change of education is about technical solutions rather than pedagogical innovation. Developing appropriate change strategy is therefore crucial.

Fullan (2003:30) suggests that moral purpose should be the main driver for leaders to change education. In his framework for leadership Fullan (2001:4) identifies five essential elements for managers to lead the change process: moral purpose, understanding the change process, relationship building, knowledge generation, and coherence building. The first essential part is moral purpose. Fullan describes this as the capacity to make a positive difference in the lives of people and how people relate to each other. Fullan suggests that leadership, if it is to be effective, should

*.....(1) have an explicit 'making-a-difference' sense of purpose, (2) use strategies that mobilize many people to tackle tough problems, (3) be held accountable by measured and debatable indicators of success, and (4) be ultimately assessed by the extent to which it awakens people's intrinsic commitment, which is none other than the mobilizing of everyone's sense of moral purpose.*

Fullan (2001:20)

The second part of Fullan's framework emphasises that leaders should understand the change process. Changing is not innovating the most or having the best ideas but understanding change means that leaders know that one of the main points in change is doing things differently, transforming the culture. Another important step in the change process for leaders is to pay attention to people and to building relationships (Fullan, *ibid* p.41). According to Fullan (2002:7) if relationships improve then the change process improves.

*....new work on knowledge creation and sharing is central to effective leadership. There are several deep insights here. One is that information (of which we have a glut) only becomes knowledge through a social process. This is why relationships and professional learning communities are essential.*

Fullan (2002:7)

The last part of Fullan's framework stresses the importance of coherence. This means that anyone in the organisation has to have accountability for the change process and that the process of knowledge creation and sharing activities is embedded in the whole organisation, and that there is a shared commitment about the whole change (Fullan, 2001:118). Effective leaders are those who possess energy, enthusiasm and hope to make people feel that the most problems can be tackled (*Ibid*, p. 7). In his view the results of coherence making will be that people have external and internal commitment and that more good things happen and fewer bad things happen. The components of this framework are displayed in Figure 3.

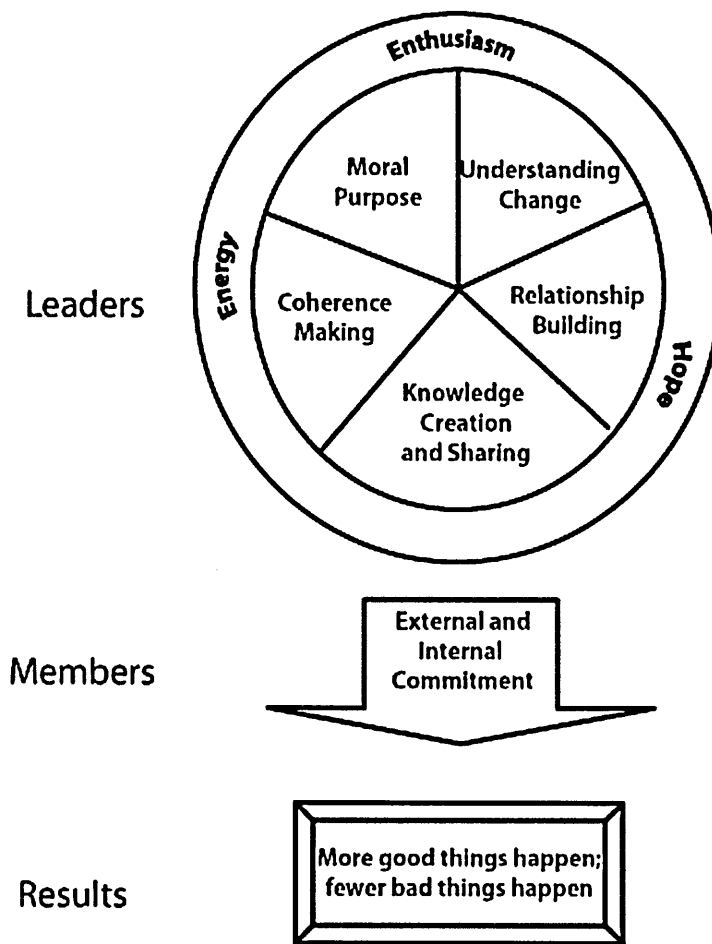


Figure 3: A Framework for Leadership, Fullan, 2001

The second component of Fullan's framework, understanding change is the question 'why'. Maurer (2011:12) stresses the importance of telling people why change is needed. Kotter (1996:36) defines the 'why' question as creating a sense of urgency. In order to get cooperation to transform organisations, establishing a sense of urgency is essential because when urgency is low it will be very difficult to convince individuals to create and communicate a change vision. In his view, managers often begin by telling how it should be done. To implement change successfully Kotter (1996) developed an eight stage model:

1. *Establishing a sense of urgency.* Be aware of the potential threats, and the opportunities that could be exploited. It takes time in this step to build the urgency before moving to the next steps.
2. *Creating the guiding coalition.* A guiding coalition should have enough position power and expertise. Furthermore this group should have good

credibility, reputation and leadership to drive the change process. According to Kotter the guiding coalition has four characteristics; 1) Position power involves people that are key players and have the power to inspire people and to lead the change process; 2) Expertise, people that have knowledge of the domain and who are able take the relevant decisions; 3) Credibility, people with good reputation in the organisation that are taken serious by other people; 4) Leaders to drive the change process.

3. *Developing a vision and strategy.* A clear vision refers to that single spot on the horizon where the organisation is heading to. Such a good vision clarifies the direction for change, it motivates people to take action and it helps to coordinate action of different people in a fast and efficient way.

4. *Communicating the change vision.* Kotter (1996:72) writes that this vision should be easy to communicate within five minutes. Therefore it is necessary for managers to put themselves into the shoes of the audience and “*imagine what the world looks like through their eyes*” (Maurer, 2011:12). Hayes (2002, p. 115) states that change managers have a tendency to communicate information downwards about what they think is relevant for staff to know about the change. But change managers should lead by example, showing behaviour that is consistent (Kotter, 1996:90) and explaining issues that seem to be inconsistent and which might undermine the credibility of the communication. Maurer (2011:13) advocates developing a multilingual approach to make sure that everybody understands the same language when communicating the change. When management has defined a policy for change they should keep control over the implementation of that change (Ramsden, 1998:30).

5. *Empowering employees for broad-based action.* Empowering means removing barriers to make the change possible. Empowering people requires a shared sense of purpose, and the right structure in the organisation. People also have to be trained in the new way of working. If people don't learn new skills and attitudes, they will feel disempowered.

6. *Generating short-term wins.* Creating short-term wins can show people that sacrifices are paying off. They can give people the opportunity to relax a short time and celebrate because working on a long tension is not healthy. It can also convince people higher in the hierarchy that the transformation is on track.

7. *Consolidating gains and producing more change.* Once the change is implemented it needs consolidating and perhaps bringing more people in to develop more change.

8. *Anchoring new approaches in the culture.* The biggest impediment to creating change in a group is culture (Kotter, 1996:155). After the norms and values are changed the rest of the change is easier to put into effect. Shifting to a new set of practices requires a lot of time. As Kotter writes:

*The first step in a major transformation is to alter the norms and values. After the culture has been shifted, the rest of the change effort becomes more feasible and easier to put into effect.*

Kotter (1996:156)

In this case Otto University wanted to transform education. Main stakeholders in this change were the teachers who had to make “*a radical shift in their orientation from a view of teaching as transmitting information and ideas to one of directly attending to the process of learning in their students*” (Ramsden,1998:18). Transforming education with the use of ICT changes the way in which teaching takes place. Teachers should become involved in learning communities in which teachers and leaders work together and focus on student learning (Fullan, 2003). As we have seen in the framework for leadership of Fullan (2001), becoming involved in learning communities to improve change the culture of teaching in higher education can only be successful if relationships improve. If teachers actively participate in communities to learn from peers and develop knowledge about the use of ICT in education they can become change agents. Caldwell defines a change agent as



.....an internal or external individual or team responsible for initiating, sponsoring, directing, managing or implementing a specific change initiative, project or complete change programme.  
Caldwell (2003:139)

According to Hayes (2002:17-19) a change agent is a manager or other person who has the ability to affect the way an organization responds to change. This can be done from two perspectives in which change agents can affect the outcomes. In the Deterministic View, the ability of the manager is limited because the main forces in change lie outside the organization. In the Voluntarist View, the change agent can have great influence. In this view there is the assumption that change agents can make a difference and that they can be trained to manage change more effectively. Change agents can bring results that they would not have been able to do in their normal jobs (Kanter, in Osland et al, 2001:565). Therefore 'fresh eyes' are needed, high-potentials and professionals in the organization that bring in new ideas. Every change agent should have a management 'sponsor' to help them to identify opportunities outside their current jobs. Management support is a key success factor for innovators to act as change agents on a voluntary basis, as Trowler et al (2003:12) state: "*Traditional educational development gets the volunteers, who then face enormous problems trying to 'sell' their message to their colleagues*". Kotter (1996:57) emphasizes the power of a community of change agents to lead the change. A key factor is the strategic choices of this coalition that determine the effectiveness of an organization in this change process (Hayes (2002:17). Changing education with the use of ICT demands investing in the professional development of teachers and definition of role models for the use of ICT in teaching.

## **2.7. Closing remarks**

The purpose of this chapter has been to describe the impact of the introduction of ICT in higher education and how universities manage and lead change in the use of ICT. The case on which this study is based is about how a group of staff, mostly teachers, formed a network of ICT coaches in order to share and create knowledge about the use of ICT in the classroom which could

then be used to train their colleagues in the transformation of education with ICT.

With the introduction of ICT in education the role of teachers in universities has changed. Therefore, in this chapter, literature about the changing role of teachers in the transformation of education was explored. The professional development of teachers and the role of educational technologists were explored in order to understand what factors are important in the implementation of ICT in higher education. To understand the challenges of implementing educational change, it is also important to understand how universities are organized, the implications of the structure of universities for change, and how this related to the case explored in this study. The organisational structure of universities also was described in order to understand how this could have influenced the role of senior management in this case.

The similarities of the Model of Instructional Transformation (Riber and Welliver, 1989) and the Phases of Change (Itzkan, 1994) were discussed to understand the objectives of Otto University in this case. The educational vision of Otto University was based on the model of Itzkan.

It is important for teachers to develop a knowledge domain about the pedagogical use of ICT in education. This particular case study was designed to research the creation and sharing of knowledge in the domain of e-learning in a network of ICT coaches, and to explore factors that are important in face-to-face or virtual networking. In the next chapter the importance of knowledge creation and knowledge sharing in the change of attitude and behaviour towards the use of ICT in education is considered.

## CHAPTER 3

# Knowledge and knowledge sharing in communities and networks.

### 3.1. Introduction

Professional development of teachers in order to transform education through the use of ICT makes it necessary for universities to define a formal knowledge base of the basic ICT competences of teachers (ten Brummelhuis et al, 2010). This means not only looking at how to use the ICT applications but also at what these applications can do to integrate ICT into teaching practice. Simons (2001) differentiates between ICT as a replacement for teacher centred education and the use of ICT *in* education. Chapter 2 explained this as the transformation from *substitution* to *transformation*, an integrated use of ICT in education. The way teachers use ICT in their teaching practice may depend on their attitude towards the use of ICT and may determine their behaviour regarding how ICT is used. The management of knowledge has increasingly appeared in research articles over the last 20 years, explaining the processes of knowledge creation, sharing and use through the use of networks (Phelps et al, 2012). The people who use ICT in their teaching activities are in the best position to manage this knowledge because they use the knowledge in practice (Wenger 2004:2), and because it is embodied in their culture and socially constructed (Hislop, 2005).

This chapter will identify the role of knowledge in organisations and in the change of attitude and behaviour. Two concepts of knowledge management are explored in this chapter: knowledge networks and communities of practice. Knowledge management is seen as a management activity to enhance the sharing and creation of knowledge (McElroy, 2003:54). Sharing and creation of knowledge are basic principles of social constructivism and, as an introduction to the knowledge management concepts, the chapter begins with a short introduction of social constructivism.

### 3.2. Social constructivism

The epistemological starting point in this study of the knowledge network of the ICT coaches draws on constructivist learning theory. Knowledge networks are places where people share and create knowledge (Phelps et al, 2012) and the ICT network of Otto University was formed to create and share knowledge about the use of ICT in education. People learn by building on what they have learned previously and this is in contrast to the view of learning as a passive transmission of information from one individual to another (Hoover, 1996). This way of learning in which learning is an active process, and where learners construct new knowledge based upon current or past knowledge is the theoretical framework of Bruner (1960, 1966). Bruner's theory of constructivism is that the learner makes his own interpretation of the information and establishes his construction of knowledge on the basis of his previous knowledge and experiences. In a constructivist learning environment people are encouraged to think independently and are helped by others to attain their own intellectual identity. Schunk (2004) argues that constructivism is a philosophical explanation about the nature of learning.

*Constructivism does not propound that learning principles exist and are to be discovered and tested, but rather that learners create their own learning.*

Schunk (2004:286)

Social Constructivism (Vygotsky 1978, Bandura 1977) is the theory that people reflect on the ideas and comments of others (peers and tutors) and build on that knowledge. Jonassen (1991) writes:

*Learners construct their own reality or at least interpret it based upon their perceptions of experiences, so an individual's knowledge is a function of one's prior experiences, mental structures, and beliefs that are used to interpret objects and events. What someone knows is grounded in perception of the physical and social experiences, which are comprehended by the mind.*

Jonassen (1991:6)

One of the main theorists of social constructivism, Lev Vygotsky (1896 - 1934), argued that the learning should not be separated from the social context. One area of his work is the concept of 'the zone of proximal development' in which he argues that there is a difference in the actual development of people's knowledge and the knowledge that is developed with the help of others.

*The zone of proximal development is the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers.*

Vygotsky (1978:33)

Lave and Wenger (1991:48-49) interpret Vygotsky's 'zone of proximal development' into three categories: 1. the interpretation of scaffolding, that is the problem-solving ability when assisted or working together with more experienced people; 2. the cultural interpretation, which is the distance between the cultural knowledge and the everyday experience of people; and 3. the collectivist or societal perspective, which is concentrated on the process of social transformation. Lave and Wenger (1991:35) argue that "*learning is an integral part of generative social practice in the lived-in world*". Their theory of '*legitimate peripheral participation*' (Lave and Wenger, 1991) is based on the idea that '*newcomers*' enter into communities of practice and learn and create knowledge from '*old-timers*'.

*Legitimate peripheral participation refers both to the development of knowledgeably skilled identities in practice and to the reproduction and transformation of communities of practice.*

Lave and Wenger (1991:55)

According to Vygotsky learning takes place when learners are integrated in a knowledge community where they interact with people with common interests and assumptions and are creating or constructing meaning through this social process.

*Every function in the child's cultural development appears twice: first, on the social level and, later on, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals...*  
Vygotsky (1978:57)

The theory of social constructivism is relevant to this case study because a network of ICT coaches was initially established to function as a place where people learn from each other and where the participants in the network develop knowledge by socializing and by sharing practice and gaining experience in the use of ICT in education. Sharing knowledge and knowledge creation can be managed in organisations. Karl Wigg at a Swiss Conference in 1986 coined the term 'knowledge management' (Liebowitz, 1999:1-7) and defined this as

*...the systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets.*  
Wigg (1997:2)

Knowledge can be managed in communities of practice or in (knowledge) networks. Before discussing these concepts later, this chapter will first define what knowledge is, and how knowledge relates to people's attitude and behaviour.

### **3.3. Knowledge and the relation to attitude and behaviour**

#### **3.3.1. Defining knowledge**

Because of the growing importance of knowledge in our economy (Mathi 2004, Cross et al 2001, Wenger 2004, Robert 2000) focus has turned to knowledge management in organisations since the development of knowledge is an important asset in the competition with others (Eisenhardt & Graebner, 2007). The growing importance of knowledge has also had its effect in the

research literature. The word 'knowledge' has increasingly appeared in research journals over the past twenty years (Phelps et al, 2012:1116).

In the knowledge management (KM) literature, knowledge is defined in different ways. Davenport and Prusak (2000) argued that data, information, and knowledge are different concepts. They described data in the organizational context as records of transactions without a meaning about these records or why these transactions were made and if these transactions will be made in future again. Information is seen as data that is communicated in documents in a variety of forms and types. In their view knowledge is

*...a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.*  
Davenport and Prusak (2000: 5)

Nonaka and Takeuchi make a distinction between tacit knowledge and explicit knowledge.

*Tacit knowledge is personal, context specific, and therefore hard to formalize and communicate. Explicit or 'codified' knowledge, on the other hand, refers to knowledge that is transmittable in formal, systematic language.*  
Nonaka and Takeuchi (1995: 59)

In organizations, people embed knowledge in routines and experiences. Abel and Oxbrow (2002) therefore define knowledge as

*The expertise, experience and capability of staff, integrated with processes and corporate memory.*  
Abell and Oxbrow (2002: 73)

Scarso et al (2009) give examples of explicit knowledge as documents, formulas, technical data, and list tacit knowledge as experience, feelings, and perceptions. Apart from explicit and tacit knowledge, Rosenberg (2001:67) also distinguishes organisational and individual knowledge. Knowledge management in the 1990s focussed on the conversion of tacit knowledge to explicit knowledge.

McElroy (2003: 4) distinguishes first-generation knowledge management and second-generation knowledge management. In the so-called first-generation knowledge management the focus was on the development of repositories such as Rosenberg's Pyramid of Knowledge Management and the support of Information and Communication Technology (Hislop, 2005; Huysman 2003, McElroy, 2003). But in second-generation knowledge management, people are involved in social processes

Hislop (2005) distinguishes two perspectives of knowledge. On the one hand, the objectivist epistemology of knowledge, seen as derived from an intellectual process and disembodied from an object. On the other hand, the practice-based epistemology of knowledge, where knowledge is embedded in practice and knowing and doing cannot be separated. Objectivists believe that knowledge is an entity. It is the positivistic view that knowledge is based on facts and figures. In this perspective explicit knowledge is preferred over tacit knowledge. Another dimension in this perspective is that all knowledge can be codified and is seen as a cognitive, intellectual entity. Kimble et al (2001) define this cognitive knowledge as 'hard' knowledge.

Second-generation knowledge management (McElroy, 2003) developed knowledge as something that we produce in a social system. Kimble et al (2001) defines this as 'soft' knowledge. Hard knowledge is more formalized and soft knowledge is more subtle, implicit and socially constructed. In this practice-based perspective (Hislop, 2005) knowledge is also embodied in people, socially constructed and culturally embedded.

*From this perspective, knowledge isn't regarded as a discrete entity/object than can be codified and separated from people.*



*Instead, knowledge is inseparable from human activity. This activity is to some extent knowledgeable, involving the use and/or development of knowledge.*

Hislop (2005:28-29)

The difference between the objectivist and the practice-based epistemology of knowledge is described by Brown & Duguid (1991) as “a canonical practice and a non canonical practice”. In the canonical practice, workers in an organization work “by the book”. In a noncanonical practice the workers socially construct new knowledge by shared narratives and stories. Brown and Duguid claim:

*..the actual non canonical practices of interstitial communities are continually developing new interpretations of the world because they have a practical rather than formal connection to that world.*

Brown & Duguid (1991:52)

The ideal outcome of knowledge management is that ‘people manage knowledge as part of their daily business without thinking of it as an extra task’ (Collison and Parcell, 2001:23). The authors illustrate this with the competence model.

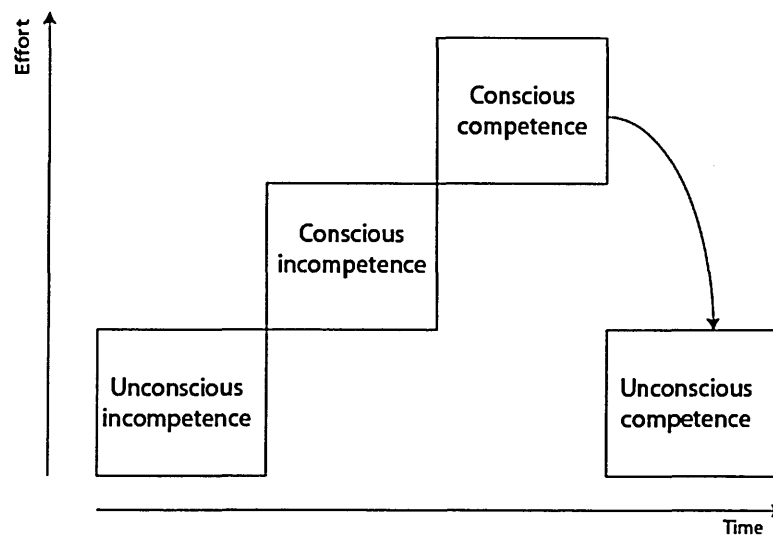


Figure 4: Competence Model, Collisson & Parcell, 2001

In this model people are unconsciously incompetent until they become aware that they are incompetent. Then they start learning by using tools and resources to improve their knowledge until they become consciously competent. The last stage is where the internalisation is complete and people are unconsciously competent. The knowledge becomes tacit and changes the information in experience (Weggeman, 2000:39). The ultimate aim of knowledge creation and knowledge sharing is to enable people to become unconsciously competent (Collison and Parcell, 2001: 26).

This case is about the use of knowledge management in higher education to enhance the pedagogical use of ICT in education. The knowledge that teachers have about the use of ICT in education, their beliefs and attitudes as a result of that knowledge leads to a certain behaviour in the use of ICT in education. The objective in the ICT coach network was to change the behaviour of teachers in such a way that they independently were able to develop the use of ICT in their teaching practice. The literature about knowledge, attitude and behaviour therefore is explored in the next section to provide a basis for understanding how the ICT coaches shared and created knowledge about this subject.

### **3.3.2. Knowledge, attitude and behaviour**

Bircham (2003:19) researched the behaviour of people in the process of knowledge sharing. She claims that someone who shares knowledge must have a stimulus or invitation to share that knowledge, e.g. a question from a colleague or a request from the management. The author argues that the attitude of someone who receives knowledge is dependent on the way this question is asked (for example an open or a closed question). The corresponding answer affects the attitude in relation to the received knowledge. The relation between knowledge, attitude and behaviour has been researched in different fields of practice. Research has been done about the influence of marketing and communication to change knowledge, attitude and behaviour (Van Woerkom and van Meegeren, 1991; Floor and Van Raay, 2002; van Riel, 2001; Pol, Swankhuizen & Van Vendeloo, 2009). In health care, research has been done on how knowledge and attitude changes the

behaviour e.g. to prevent obesity (Baranowski et al, 2003) or the relation between knowledge sharing and attitude (Bircham, 2003).

Pol et al (2009) state that there are two kinds of behaviour: automatic behaviour and planned behaviour. At least 95% of our behaviour consists of automatic behaviour, that is behaviour that we perform without thinking. Moederschein (2006:15) explains this with the example of walking. We don't think about how we walk and where to put our feet. We do that automatically. Thinking about it would cost too much energy. Both automatic and planned behaviour can be changed with communication, for example mass communication can inform people about innovations in society (Moederschein, 2006:12). It is important that the sender of the message is trustworthy to the receiver to influence their beliefs. 'False' beliefs can be held about the way we see the world is seen and these 'false' beliefs may influence behaviour (Hartley, 1993:7). Booth-Butterfield (2007) writes that one can speak of persuasion when the sender is trying to change the receiver and that communication is used to change a receiver's attitude. He defines attitude as the judgement of a thought about something. He refers to the MODE model of Fazio (1986). According to Fazio (1990:77) attitudes sometimes relate to subsequent behaviour and there is some understanding in literature of just when that 'sometimes' is, but too little attention has been given to how attitudes guide behaviour. Fazio (1990:78) writes that much of our behaviour is spontaneous and not all of our behaviour is the result of reflective processes that lead to a planned outcome. His main argument is that:

*An attitude is viewed as an association in memory between a given object and one's evaluation of that object.*

Fazio, R.H. (1990: 81)

The MODE Model (Motivation and Opportunity as Determinants of the attitude-behaviour relation) was developed by Fazio (1986). The key to the model is that attitudes must be activated from memory if the attitude is to guide subsequent behaviour. His hypothesis is that the strength in which attitude

objects are evaluated and associated in memory determines whether attitudes are activated automatically when observing the attitude object.

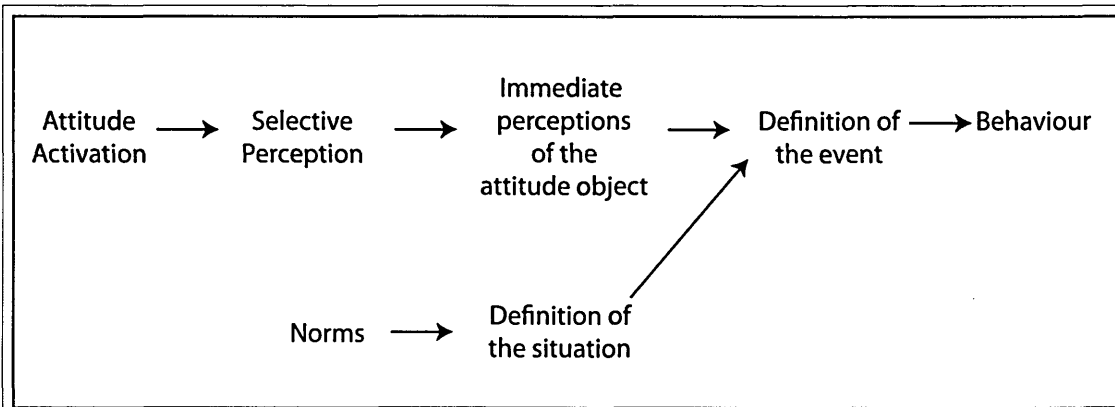


Figure 5: The MODE Model, Fazio, 1986

When a person encounters an attitude object his attitude is only activated if his evaluation of the object is strongly associated in memory. The next step is that the person has a selective perception (positive or negative) of the object. This selective perception produces perceptions that are consistent with the attitude. Normative guidelines may affect how a person defines the event. Petty and Cacioppo (1986) developed a theory that also relates to the way people elaborate an attitude object; the Elaboration Likelihood Model of persuasion (ELM). The main question in this model is how attitude is changed in the way a persuasive question is elaborated. Petty and Cacioppo (1986:127) define attitude as '*general evaluations that people hold in regard to themselves, other people, objects and issues*'. The basic argument of the ELM is that information can be elaborated in two ways, either centrally or peripherally.

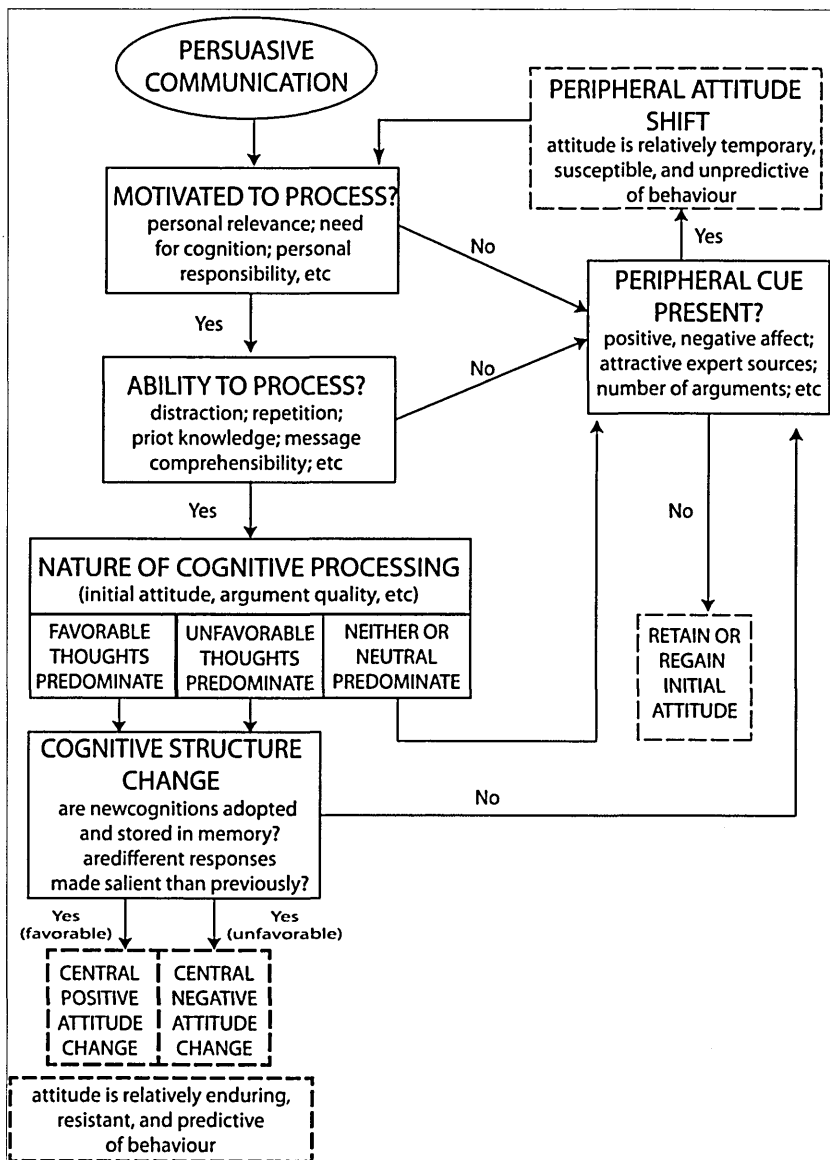


Figure 6: The Elaboration Likelihood Model, Petty and Cacioppo, 1986

In the first type of persuasion, the central route, the information is elaborated rationally based on prior knowledge and personal responsibility (comparable with planned behaviour). The receiver requires a great deal of thought before he accepts the message. The second type of persuasion is peripheral. Here the receiver is highly involved and motivated to elaborate the information. However the content of the message is less important than the perceived credibility or attractiveness of the source of information or the context in which it is received determine the attitude and the behaviour (compared with automatic behaviour). According to McQuail (2010: 517) the model has limited predictive value but it helps to summarize and describe

aspects of persuasion. Petty and Cacioppo suggest that attitudes formed under high elaboration, the central route, are stronger than those formed under low elaboration.

Martin Fishbein and Icek Ajzen (2010) in their 'Theory of Reasoned Action' have developed the relation between attitude and behaviour. Their fundamental argument is that a person's attitude is formed by their beliefs about performing a particular behavioural act. In this theory they identified the determinants of behaviour. They argue that:

*...human social behaviour follows reasonably and often spontaneously from the information or beliefs people possess about the behaviour under consideration.*

Fishbein and Ajzen (2010: 20)

Fishbein and Ajzen developed a model (see figure 7.) that consists of three types of beliefs that are distinguished with the performance of behaviour. The individual and social background that people have and their knowledge determine how people believe they should behave.

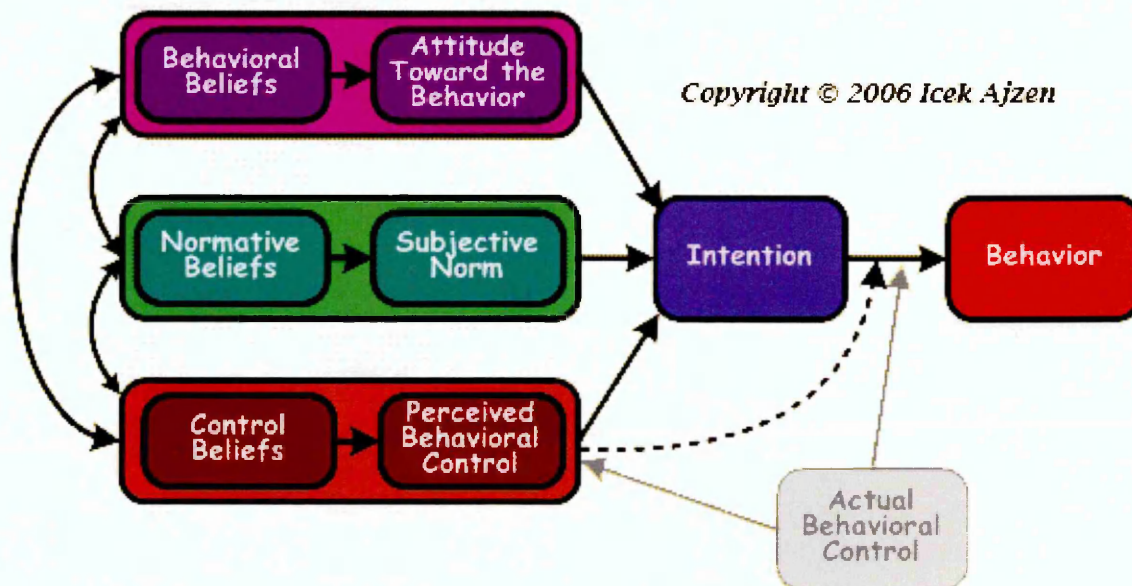


Figure 7: Model of Reasoned Action, Fishbein and Ajzen, 2010

The first is *Behavioural Beliefs*. When people believe that there are negative or positive consequences of their behaviour, they form an attitude toward

personally performing the behaviour. If this perception is more positive than negative, they will show a favourable attitude. Secondly, interaction with other people may result in an attitude that is a perceived norm of the belief an individual has about the beliefs of the people the individual interacts with, the *Normative Beliefs*. People may perceive social pressure if the majority of the people they engage with disapprove of the behaviour. That is because we have a clear idea how others in our environment expect us to behave and that the norm of the group we belong to tells us how to behave (Hartley, 1993: 84) The last and third determinant is *Control Beliefs*. This is where people form beliefs about personal and environmental factors. These beliefs guide individuals towards the intention to perform behaviour or the performance of the behaviour. The general rule of this model is:

*....the more favourable the attitude and perceived norm, and the greater the perceived behavioural control, the stronger should be the person's intention to perform the behaviour in question.*

Fishbein and Ajzen (2010: 21)

Fishbein and Ajzen argue that attitude can be classified into four broad categories: *Affect*, that is a person's feeling, emotion towards an object, a person or an issue; *Cognition*, which refers to a person's knowledge of an object; *Conation*, that is the behavioural intention and action that a person has to an object or an issue; and *Behaviour*, the observed overt acts. Fishbein and Ajzen replace these categories with other terms, for example: 'attitude' for affect, 'belief' for cognition and 'intention' for conation, intentions to perform various behaviours.

*Intentions may be viewed as a special case of beliefs, in which the object is always the person himself and the attribute is always a behaviour.*

Fishbein and Ajzen (1975: 12)

Ajzen & Madde (1985) suggest that there are many factors that can influence and interfere with control over intended behaviour. These can be internal such as skills, abilities and knowledge, but also external such as time,

opportunity and the extent to which people are dependent on the cooperation of other people in this behaviour.

In relation to the change of behaviour, two concepts of knowledge management are explored in this chapter: networks and communities of practice. The ICT coach network in this case was established with the objective to develop a community of practice to enhance the use of ICT in education. In the next section the literature about knowledge networks is explored.

### **3.4. Defining knowledge networks**

In this case study, teachers of a university were asked to act as ICT coaches and participate in a network of ICT coaches. When people meet together, either face-to-face or virtually to exchange ideas or work together, terms are used like networks, communities of practice or social networks. This section examines the concepts underlying these terms and whether there are similarities or differences between them. Van Aalst (2003: 34) defines networking as *'the systematic establishment and management of internal and external links (communication, interaction and co-ordination) between people, teams and organisations („nodes“) in order to improve performance'*. The terms systematic and management would suggest that networks are deliberately setup with a predefined objective. However Sliwka (2003: 51) argues that networks are more or less hierarchy free institutions that do not depend on traditional top-down administration. Dalin (1999: 348) defines networks as *'temporary social systems in which individuals can gain maximum informational gains with minimal effort'*. According to Sliwka (2003:58) networks are usually open constructs that grow over time.

#### **3.4.1. Characteristics of a network**

The term network, especially the term Social Network, is often used nowadays on the Internet. Social Networks always seem to be associated with Internet applications like LinkedIn, Facebook, You Tube and Twitter. Those online networks can be very important for people to create a sense of belonging to certain groups. Notley (2009) researched social networks of teenagers in Australia considered 'at-risk' of social exclusion. Although the



teenagers in her study used these online social networks to connect with their offline social networks, the study showed that the participants developed new social networks based on shared interests. The study highlighted the social inclusion value of the use of online social networks. This case study focuses on networks, either face-to-face or virtual, as a construct for learning, knowledge creation and sharing.

According to van Aalst (2003:35) the reasons why networks are so attractive are:

- Networks open access to a variety of sources of information.
- They offer a broader range of learning opportunities than is the case with hierarchical organisations.
- They offer a more flexible and, at the same time, more stable base for co-ordinated and interactive learning than does the anonymity of the market.
- They represent mechanisms for creating and accessing tacit knowledge.

Some networks can sustain for a long time, other only have a short-term objective. For Dalin (1999:349) networks have four functions. Networks can connect like-minded people to innovate or to lobby certain ideas (political function). Networks allow people to exchange information beyond normal hierarchy routines (Information function). When people are isolated, networks can offer opportunities for collaboration and knowledge exchange (psychological function). Finally, networks can offer opportunities to enhance skills that are normally not offered in organisational training routines (skills function). Perkins (1991) emphasises that a key condition for successful networking in education is the social construction of knowledge. Networks that have elements of social constructivism contain construction kits, which are classic parts of settings for learning. Social constructivist learning environments should have information banks or links to those information resources and they should place control in the hands of the learners. A main aspect of social constructivism is when learning takes place in peer to peer

communication and the creation or construction of meaning in a knowledge network.

Buchberger et al (2005: 281) suggest a number of key success factors for networks. Networks should have a common and shared purpose for the participants and enough support should be given for all participants to create, utilise and transfer knowledge. Furthermore social construction of knowledge is a key condition. All participants should have easy access to information; channels of communication should be established to maintain collaboration and conversation.

When networks grow it is more difficult for members to maintain strong ties with a significant number of network participants (Hislop, 2005:244). This is what Burt (2000: 373) identifies as the network constraint. Network constraint is the extent to which a person's network is concentrated with people who have overlapping knowledge and information (redundant contacts). Burt (2000) identified three more dimensions to characterise inter-personal networks. Network hierarchy describes the extent in which a network is formed around a minority of contacts. In organisations the hierarchical network is often built around the boss. Another dimension is network size, the number of contacts in a network, and the last dimension is network density. Network density is the average strength of a connection between contacts.

*.....strong connections between contacts increase the probability that the contacts know the same information, and the direct connections eliminate opportunities to broker information between contacts.*

Burt (2000:374)

However strong connections are not enough to know the same information. A knowledge network is driven by the need of practitioners to find solutions to practical problems and exchange knowledge (van Aalst, 2003:36). Often the term knowledge network is used when the focus in a network is on social relationships to create knowledge in organisations. Phelps et al (2012) define a knowledge network as:

*A set of nodes - individuals of higher-level collectives that serve as heterogeneously distributed repositories of knowledge and agents that search for, transmit, and create knowledge - interconnected by social relationships that enable and constrain nodes' efforts to acquire, transfer, and create knowledge.*

Phelps, et al (2012: 1117)

Phelps et al (2012) identified three types of knowledge-related outcomes: first *knowledge creation* which refers to the creation of new knowledge; second *knowledge transfer*, which refers to the efforts of people to share knowledge with a receiver and the receiver's efforts to acquire this knowledge, and third *knowledge adaption*, the use and implementation of knowledge in the organisation.

Within a network, members can take a different position towards other members in the network. The strength of interpersonal connections (ties) is the extent to which an individual is connected with other members in the network and can be seen as pipes through which information and knowledge flow in a network (Singh, 2005). Nowadays connections with others in a network are seen as 'friends'. The way Facebook ([www.facebook.com](http://www.facebook.com)) is built is a good example of that. A basic principle in such a social network is that if two people have a friend in common, then there is an increased likelihood that they will become friends themselves in future (Easley and Kleinberg, 2010:48). Strang and Tuma (1993) found that persons with more ties to prior adopters of innovation, for example innovation in the use of ICT in education, are more likely to adopt new knowledge. A central position in a network can also influence a more positive adoption of innovation (Nerkar and Paruchuri, 2005). The density of a network, that is the extent to which people are connected in a network, determines how knowledge is transferred in networks. High density in a network increases knowledge transfer and enhances learning (Morrison, 2002). Higher density in social networks give members greater access to and use of information (Lin, 1999:31). Research had shown (Phelps et al 2012) that strong interpersonal ties in a network are more effective than weak ties in enhancing knowledge transfer and learning

because tie strength can increase the transfer of complex, tacit knowledge (Centola and Macy, 2007: 726). The efficiency of knowledge transfer between members in a network is also dependent on their geographic distance. Bell and Zaheer (2007:970) argue that knowledge tends to be more homogenous within a geographic region than across regions.

The positive effects of knowledge networks relate to improved knowledge transfer and learning (Schönström, 2005:19). However there are also negative aspects that relate to network size. In large networks the efficiency of communication is reduced if the path in the connection between two members is too long (Hansen, 2002:233). In large networks, especially the ones that are entirely built online, the social ties are weaker and it takes time before a common language is developed (Boland and Tenkasi, 1995: 352).

### **3.5. Defining Communities of Practice**

#### **3.5.1. Introduction**

A potentially powerful approach to support knowledge sharing and creating in organizations in the field of knowledge management is argued (Wenger 1998, Brown, 2005) to be the concept of learning communities or communities of practice. According to Wenger (2003) learning is the essential purpose of a community of practice (CoP) and the most important reason to establish CoPs is because people are in need of knowledge (Huysman and de Wit, 2004). In this section the main concepts of learning communities or communities of practice (CoPs) are explored and the way CoPs are established and developed.

#### **3.5.2. Learning Communities**

Before explaining the main concepts of a community of practice it is necessary to define what a learning community is. In their framework of a learning community, a community of inquiry, Garrison and Anderson (2003:27) argue that individual knowledge construction is shaped by the social environment. In their view this community of inquiry consists of three elements: cognitive presence, social presence, and teaching presence.

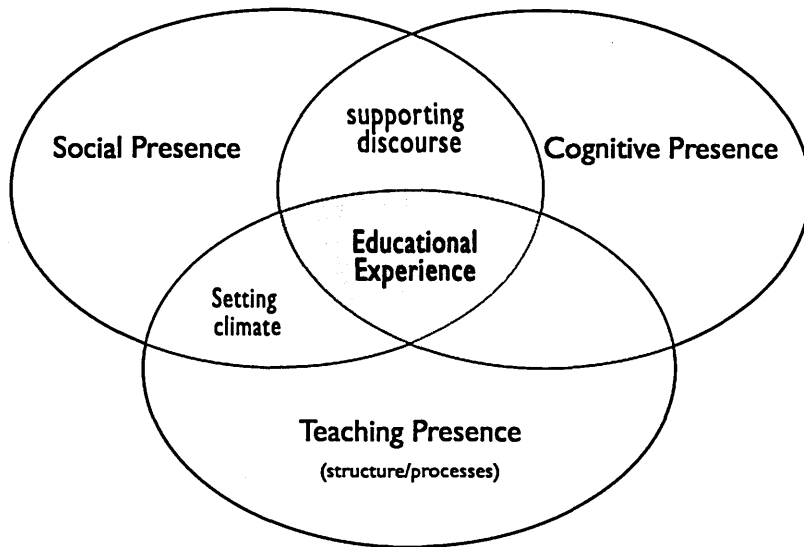


Figure 8: Community of Inquiry, Garrison and Anderson, 2003

Cognitive presence is defined as ‘higher-order thinking and learning’; it is the extent

*...to which learners are able to construct and confirm meaning though sustained reflection and discourse in a critical community of inquiry.*

Garrison, Anderson, and Archer (2001:11)

Social Presence is the ability of participants to project themselves as personalities. Greenhow (2011:8) argues that social belonging and connectedness in educational settings give better results for learners. According to Garrison and Anderson (2003:50) the social presence in a community is important to make collaboration and critical discourse possible. This may be problematic in an online environment because non-verbal communication is not possible. In that case, participants have to use written communication to be socially present. That means that it is important to compensate for the fact that body language and spoken communication is absent through other forms of expression. For example, so called ‘emoticons’ can express a participant’s feeling of happiness or sadness. Garrison and Anderson (2003:51) use three categories of social presence: Affective (emotions, humour), open communication (asking questions, expressing

agreement, referencing to other's posts), and cohesive communication (addressing of referring to participants or group by name, greetings, closures). However Salmon (2002:20) argues that the lack of face-to-face and visual clues in online participation is a key ingredient of success rather than a barrier. There are more opportunities for participants to get to know each other because participants can access online communities in any time and at any place.

The third and last element in the community of inquiry, teaching presence, is about the need for somebody to facilitate, and moderate. Teaching presence is...

*.....the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes*

Anderson, Rourke, Garrison and Archer (2001:5)

### 3.5.3. Defining a Communities of Practice

Lave and Wenger (1991) introduced the concept of communities of practice as a social environment where learners participate in the work process, not just by acquiring knowledge but by being active participants. In their conceptualization of Legitimate Peripheral Participation they describe observations of different apprenticeships...

*..... where learners inevitably participate in communities of practitioners...and where.... the mastery of knowledge and skill requires newcomers to move toward full participation in the socio-cultural practices of a community.*

Lave & Wenger (1991:29)

Wenger made a definition of Communities of Practice, which is commonly used. He defines communities of practice as:

*Groups of people who share a passion for something that they know how to do, and who interact regularly in order to learn how*

*to do it better.*

Wenger (2004:2)

Wilson (1995:27) argues that communities of practice are places where people work together, support each other, and where they undertake problem-solving activities. Brown and Duguid (1991:41) identify CoPs as a concept for 'learning-in-working', as a bridge between learning and innovating. A community of practice differs from a project team or work group in an organization because a project team has an assignment and when this assignment is done the project ends. However a community of practice may continue unofficially beyond its original practice (Wenger, 1998:96). In this study the definition of Wenger is preferred because by using the word '*regularly*', he argues that there has to be frequent contact between community members in order to learn from each other.

#### **3.5.4. Characteristics of Communities of Practice**

A structural model for a community of practice was given by Wenger, McDermott and Snyder (2002:27-40). They identified three structural elements of a CoP.

The first element is the *Domain*. This is the fundament of the community of practice. It sets the boundaries to what the participants decide to share and which activities should be done. The domain is no abstract field of interest but consists of important issues or problems that are relevant to the members. If the domain does not inspire the members then the CoP will not function. If the members have no commitment about the domain then the community will just be a group of friends who come together. Although it is not necessary that the domain relates to the organisation, the most successful CoPs are those which combine the passions of the participants with the needs and goals of the organisation.

The second element is the *Community*. These are the people that have a relationship which is built on mutual respect and trust. Every member will bring in his or her own individual identity in relation to the community. It is paramount that members expect reciprocity when they join the community.

They are mainly motivated by benefits with regard to their own work and their position in the organisation in order to improve their career prospects, to make their work easier or to improve contact with colleagues (Zboralski, 2009: 98)

The third and last element is the *Practice*. This is a set of frameworks, cases, stories, theories, models and lessons learned. Within the practice of the community the members explore the latest developments in the domain. The practice is also a set of socially-defined ways of doing things in the specific domain. Making knowledge explicit is not a goal in itself but it should be an integral part of the community.

To determine whether a community of practice is successful or not Wenger (1998), described the characteristics that make a community actually a community of practice. Wenger developed the doughnut model of knowledge management (figure 9). This model consists of three elements with fundamental characteristics of a community: Domain, Community and Practice.

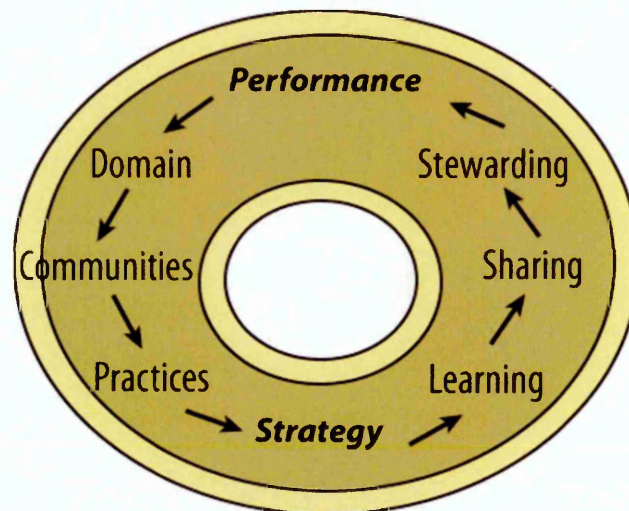


Figure 9: Doughnut Model of Knowledge Management, Wenger, 2004

### 3.5.5. Establishing Communities of Practice

There is some debate in the literature about whether CoPs should be set up and managed or whether they must just emerge. Wenger, McDermott and Snyder (2002) state that CoPs should have a natural growing process where



not all is planned ahead and where communities can evolve by themselves. In fact someone takes the initiative because he or she is interested to exchange ideas, share knowledge and find new ways of working (Hezemans, Ritzen, 2004). CoPs can be initiated by management or by external authorities or agencies. Such sponsoring means that the management provides the resources for meetings, the necessary ICT tools for virtual communities and allows the participants to spend time on it during working hours. Management support has proven to be of major importance (Hansen et al, 1999), not by directing people in the right direction but more as a broker across boundaries between practices. The role of a sponsor is also to remove barriers that obstruct community progress such as time, funding and other resources (Kelleher, 2005). Porter (2006) presents a typology for CoPs. She states that there are two general types of communities; member-initiated and organization-sponsored. The orientation of member-initiated CoPs can be social or professional while the orientation of sponsored CoPs can be commercial, non-profit or governmental. When CoPs are initiated they develop in five stages, potential, coalescing, maturing, stewardship, and transformation (Wenger et al, 2002: 68)

### **3.5.6. Development of a CoP**

How do communities of practice begin, and how do they evolve? When people in a social network start communicating about a certain topic, one of the issues is to find out whether there is a common interest. There must be a connection in insights, stories or a shared passion (Wenger et al, 2002:71). In this first *Potential Stage*, the members define the scope of the domain and find people that already network on the topic. A key issue in this stage is to identify common knowledge needs (*'what is in it for me?'*). In this first stage people try to avoid and deny individual differences. Scott Peck (1990:93) calls this a 'pseudocommunity' because people try to avoid conflicts. To move on and develop, the members have to exchange personal ideas and then the individual differences appear. In the beginning, people exchange experiences and plan the way of working. There is a danger that after the first stage there is some 'chaos' (Scott Peck (1990, p.90) as people talk for themselves, each proposing different forms of working and trying to achieve quick changes.

Wenger et al (2002, p. 80, Hezemans and Ritzen, 2004) argue that there is a critical role for the community coordinator to plan and facilitate community events and to identify important issues. This moderator or initiator clarifies the purpose, finds participants and a sponsor and sets the issues to deal with (Shaffer, 2002). Building trust and developing relations is of major importance in this *Coalescing Stage*. Members formulate the (quality) criteria and collect and share good practices (Hezemans and Ritzen, 2004). In these early stages there is a risk of an attack on the leader or moderator and of new leaders trying to manifest themselves. The only way to solve this is a stage of 'emptiness' (Scott Peck, 1990: 95). Here people have to leave their expectations, prejudices and ideologies to work on a shared ambition. Before becoming a true community, the members have to share not only their positive experiences but also their shortcomings and disappointments. Finally the community grows from 'rough' individualism into 'respectful' individualism (Scott Peck, *ibid*). In this stage the community will have productivity and creativity. Wenger (2002) describes this *Maturing Stage* as a phase where members clarify the community's focus, the role and the boundaries. The members identify so called 'knowledge gaps' and plan how to fill these gaps and the lessons learned have to be shared in the organization (Shaffer, 2002). When the CoP develops, the practice is defined and new knowledge is developed that can be used in the organisation, The *Stewardship Stage* (Wenger, 2002)

The next activities of the community are to revitalize and re-energize the community. This can be done by After Action Reviews (Collison and Parcell, 2001), and benchmarks outside the organization. The last stage is to decide whether the community sustains or is transformed to another community. It is necessary at this stage to review the community of practice and revitalize or disband the group. Wenger's last stage is the *Transformation Stage*. It is the moment that a major change in practice takes place, a leadership change or a high decrease of energy level. This will force the CoP to renew or start over again.

### **3.6. Criticism of the concept of Communities of Practice**

Although communities of practice seem to enhance the construction and creation of knowledge, it is argued in this section that there are limits, pitfalls and critical factors that determine the success of communities of practice. The concept of communities of practices is a potentially powerful notion, but its implementation can be complex. In this section the limits of a community of practice and the critical success factors are explored

#### **3.6.1. The downside and limits of Communities of Practice**

Wenger et al (2002:139) state that communities of practice also can have a downside. CoPs can be bastions that hoard knowledge. That is when it is impossible for others in the organisation to access the knowledge and resources that are created by the community, or, as Kimble and Hildret (2004: 5) argue, the interests of the community may not be aligned with those of the organisation. Wenger et al (Ibid) write that the intimacy that communities develop can be a barrier for people outside the community to participate. That is when communities become a clique and relationships among the members are so strong that it is hard to enter the community from the outside. The authors discuss the danger of communities being too arrogant to share their knowledge and claim their exclusive ownership of knowledge.

One of the main objectives of CoPs is to create knowledge in the domain and share and steward this into the organisation. However knowledge can be very “sticky”. Szulanski (2003:28) states that knowledge can be “sticky” if there is absence of proof of the usefulness of knowledge or if the source is not motivated to share knowledge. Lack of credibility is another important reason why knowledge is not shared in an organization (Szulanski 2003:28). He refers to the concept that originated from Aristotle’s observation that ‘good men’ are more influential on people’s behaviour. Despite the relevance of the community with regard to the objectives and strategy of an organisation, the knowledge that is created in a CoP may not be recognized within the formal hierarchy of the organisation (Yanow, 2004:12).

According to Ardichvilli et al, 2003:65) it is necessary for a substantial number of participants to fully participate in the community. The willingness to share

knowledge and the willingness to use the CoP as a source of knowledge are major requirements. Sliwka (2003:62) notes that trust-building and personal reliance are important in creating individual commitment to networks. Prerequisites for a successful transfer of tacit knowledge are trust, familiarity and mutual understanding (Roberts, 2000:434). However Wenger et al (2002: 145) argue that when relationships among members are so strong, CoPs become a clique and dominate other concerns in the organisation.

### **3.6.2. Critical Success Factors for Communities of Practice**

As described in Wenger's Doughnut Model of communities of practice, a key success factor is to find members who have knowledge of the domain. Working in this domain makes it easier for people to create a sense of belonging among the members of the group. The social construction of knowledge is considered to be a key condition in networking in a community (Buchberger et al, 2005). Beyond this, a key factor is that members are specialists and have a 'professional proximity' to facilitate the creation and dissemination of a common pool of knowledge inside the CoP (Scarso et al, 2009: 439). The stewarding process of Wenger's model should be clearly defined by the objectives of the organisation and in the organisation's knowledge strategy on the domain or the overall strategy of the organisation. Brown argues that it is collaboration that develops this collective pool of knowledge (Brown, 2002: 105). He also states that learning is a social process and that people learn in response to need. People form social networks along with knowledge about that practice. Members of those communities are separated from people with different practices because they have different attitudes and dispositions.

To assess the strengths and weaknesses of a CoP programme Scarso et al (2009) developed a framework in which they define six elements of a CoP. Two of these elements are external: the organizational context in which the CoP project works and the knowledge strategy of the organization. The other four elements are internal and structural and each element has several components (see table 2). To assess whether a CoP is a success or a failure many authors have researched the critical success factors and limits of CoPs (Roberts, 2006; Preece et al, 2003; Ardichville et al, 2003; Gannon and

Fontainha, 2007, Pemberton et al, 2007; Scarso et al, 2009, Wenger et al, 2002).

Pilar	Main components
<p><b>Organizational dimension.</b> The roles and relationships within the Community and between it and the rest of the organization</p>	<ul style="list-style-type: none"> <li>• Size (number of members. Degree of transferability across the organization)</li> <li>• Relationship with the existing structure</li> <li>• Formal acknowledgement</li> <li>• Governance</li> <li>• Local versus centralized management</li> <li>• Roles of members and supporting functions</li> <li>• Kind of Leadership</li> </ul>
<p><b>Cognitive dimension.</b> The specific knowledge domain, the practices and processes.</p>	<ul style="list-style-type: none"> <li>• Nature of shared knowledge</li> <li>• Cultural proximity of members</li> <li>• Knowledge gaps between members</li> <li>• Knowledge Domain</li> <li>• KM processes and knowledge flows</li> <li>• Mechanism for establishing trust</li> </ul>
<p><b>Economic dimension</b> that involves benefits, costs and relevant performances.</p>	<ul style="list-style-type: none"> <li>• Mechanisms for establishing costs and benefits</li> <li>• Budgeting, resources allocation, accounting</li> <li>• Systems to promote and reward participation</li> </ul>
<p><b>Technological dimension.</b> The role of enabling technologies.</p>	<ul style="list-style-type: none"> <li>• Kind of technological platform</li> <li>• User-friendliness</li> <li>• KM processes underpinned by technologies</li> <li>• Relations with the social/organizational context</li> <li>• Intensity of use across the CoP</li> </ul>

Table 2: Main components of the four pillars of a CoP, Scarso et al, 2009

One of the main critical success factors of a CoP is the extent to which *leadership* is present in a CoP. A strong leadership in knowledge management is needed to achieve a sense of purpose (Gannon and Fontainha, 2007; Bourhis et al, 2005). Not only leadership by the organisation's management is needed in sponsoring the CoP and facilitating members to work in a CoP. Also internal leadership and co-ordination must be present (Wenger, 2002). Pemberton et al (2007) state that leaderless communities seldom survive. Usually senior practitioners and well-respected members of the organization participate in most communities (McDermott, 2008).

An important reason for people to participate in a CoP is the overall *trust* in an organisation. If people enter a community with strangers the trust in a larger social entity is more important than the trust in individual CoP members (Ardichville et al, 2003:73). This is called the institution-based trust. Other reasons for lack of trust can arise when people in the organization are jealous because they do not take part or are not asked to join a CoP. The CoP can be seen as threatening, and exclusive to those with formal power in the organization (Pemberton et al, 2007). There may also be dominant forces when new members have different insights to older members or when new members lack the confidence to express themselves to older more experienced members (Fox, 2000). Handley et al (2006) argue that full participation may even be denied by people with more power in the community especially when newcomers want to transform the knowledge in which full participants already have invested. Many of these issues are a result of the lack of trust and motivation. Gannon and Fontainha (2007) believe that trust and motivation are necessary to make a CoP grow. Trust is established especially in the early stages of a community (Pemberton et al, 2007). In those early stages people socialize and build relationships. When people lack confidence and trust they are not motivated to share their knowledge. Verburg and Andriessen (2006: 17) believe that mutual trust and a common identity are very crucial for the willingness to share knowledge, especially when it comes to sensitive knowledge. When there is lack of trust a possible solution might be to enhance social relationships. When people meet together they develop mutual understanding and a shared culture and language that is a major factor in the transfer of knowledge. As Davenport and Prusak state:

*People who share the same work culture can communicate better and transfer knowledge more effectively than people who don't.*  
Davenport and Prusak (2000:98)

Finally, another major critical success factor is *time*. In the early stages of the community, time is needed to build up trust and motivation (Ardichvili et al, 2003; Roberts, 2006; McDermott, 2001, Coenders and Bood, 2003) and time

is needed for reflection and evaluation. However in the daily practice of organisations time seems to be rarely available nowadays (Roberts, 2006: 632).

As well as face-to-face contact, nowadays in networks and communities of practice people also meet online. The next section will explore more aspects of differences between face-to-face and virtual networks.

### **3.7. Face to face versus virtual networking**

The focus in this research is on the networking of ICT coaches, either face-to-face or online in a virtual community. This section looks more closely at online networks, how they differ from face-to-face networks and what issues these differences raise.

#### **3.7.1. Characteristics of Online networks**

The fact that nowadays a lot of communication and interaction in networks takes place online makes it necessary look at specific characteristics of online networks in relation to face-to-face communication. According to Gupta and Kim (2004) a virtual network is a place on the web where people can find each other and then electronically *talk* to others with similar interests. Preece (2000:9) argues that it is not difficult to define the term online network but that it is a slippery term because it can be looked at from different perspectives such as groups with common interest, business or pleasure, or as metaphors like an online village or an online town. Preece defines an online network by giving four criteria:

1. *People, who interact socially as they strive to satisfy their own needs or perform special roles, such as leading or moderating*
2. *A shared purpose, such as an interest, need, information exchange, or service that provides a reason for the network.*
3. *Policies, in the form of tacit assumptions, rituals, protocols, rules, and laws that guide people's interactions.*
4. *Computer systems, to support and mediate social interaction and facilitate a sense of togetherness.*

Other characteristics of online networks that play an important role are the access to shared resources and policies on how to access these resources, the social conventions, language and protocols (Whittaker, Issacs and O'Day, 1997:137).

It has already been argued that the members of a community of practice and a network should have a sense of common purpose and a strong feeling of identity and that involvement and participation in a online community creates a sense of responsibility for the shared enterprise and the goal to exploit knowledge (Wenger 1998, Kimble et al 2004, Shaffer 2002). The next section will explore the main differences between face-to-face and online networks.

### **3.7.2. Main aspects of differences between face-to-face and online networks**

Five main aspects of difference between face-to-face and online networks were found in the literature. These five aspects are: technical; social; a sense of belonging; synchronicity and a-synchronicity; and time.

#### *Technical aspect.*

In an online network the members have to get acquainted with the technology. It takes some time before a new member learns where he can find the most interesting places for discussions, the documents. It is like coming in a new home where it takes time to find your way around and where you can store your stuff. To decide what software to choose, it is important to consider how much time it will cost for participants to get familiar with the software. According to Wang and Woo (2007:273) online discussions are likely to have more problems than face-to-face discussions because more technical components are involved.

#### *Social aspect.*

In most virtual networks, members can fill in their profile and upload a picture. In this way people can get to know each other. All members can see the profiles of other members; however this does not mean that they have contact with each other. In face-to-face networks people actually meet,



shake hands, have eye contact and can see facial expressions and other non-verbal communication. Kimble et al (2001:231) researched relationship building in networks and concluded that a strong relationship was very important for the members of a network and that face-to-face meetings enabled relationships to develop quicker and go further.

#### *A of sense of belonging.*

Another distinctive feature of an online network is “*the fact that a person or institution must be a contributor to the evolving knowledge base of the group and not just a recipient or consumer of the group’s service and knowledge base*” (Hunter, 2002:96). In a virtual network people can just be ‘lurkers’. A lurker is someone who does not actively participate; he observes what is going on but remains silent (Laine, 2006:14). A lurker can come to a network space every day, not taking an active part in the discussion at all. Virtual networks can be large. Especially in larger networks it takes longer for members to have a sense of belonging because members meet at different times and at a different frequency. The social aspect of not meeting face-to-face makes it harder to establish this sense of belonging. De Vries and Kommers (2005:119) make the assumption that participants will only be an active part of an online network if ‘*motives meets gratifications*’. Such motives can be information, learning, personal identity, entertainment and companionship.

#### *Synchronous and a-synchronous aspect.*

In a face-to-face environment all members meet on the same time at the same place. A major advantage is that there is central focus in the discussion, that the chair can manage the agenda and that at the end people leave the meeting with shared conclusions. This can also be done in virtual meetings where people meet at the same time; however the moderating does take more effort in virtual meetings. In an online network, a lot of discussion takes place a-synchronously. A-synchronous discussions have the advantage that participants have more time to reflect. Another advantage is that those participants who are usually shy and silent in face-to-face meetings feel more encouraged when writing down their thoughts and therefore an a-synchronous discussion can be richer. In a study among students in comparing face-to-face

and online discussion Meyer (2003:63) found that students involved in threaded discussions exhibited higher-order thinking by contributing more exploratory comments and more integrative comments.

#### *Time aspect.*

Time is an important difference between face-to-face and virtual networks. Virtual meetings can be less effective in time because it takes a longer time to capture the discussion to a shared agreement. This can even take longer in asynchronous discussions where the frequency of participation is spread over a longer period. Asynchronous online discussions usually require a longer time frame to process. Participants need more time to read and reflect, prepare responses and type in the responses in written texts (Wang and Woo, 2007:273).

#### **3.7.3. Other aspects of online networks**

Apart from the five aspects described above there are some other aspects that are important in online networks. Apart from some general implications about trust, as described in 3.5.3, trust building is essential because a virtual network lacks the opportunity for face-to-face interaction (Gannon and Fontainha, 2007, p.4). Therefore socialising and a sense of belonging can be built by organizing face-to-face meetings (Dubé et al, 2006, Kimble et al, 2001). Where a certain level of trust already exists, members may help each other in online networks to experiment with Information and Communication Technology (ICT). Members of networks experience different environments because of the media they interact with and this can affect the extent to which mutual understanding and trust develops.

Participating in online networks demands a certain autonomy more than in traditional face-to-face environments. It requires initiative, skill and self-discipline to engage in the research, communication, collaboration and production demanded by online learning environments (Sherry, 1996). Moderators usually have power in a network because they can approve people that want to join the group (Schlager et al, 2009). Especially in online networks a strong role for a moderator or facilitator is needed to keep

members focused on the topic, to promote general questions for discussion, to filter messages and decide which ones to post. He or she should also be a fireman to extinguish attacks on other members (Preece et al, 2003) or to avoid anarchy in the group (Ardichville, 2003).

When people use computers as their main mode of interaction, the usability and interface of the online environment also plays an important role. Preece (2003) states that the number of postings in a virtual network can be so overwhelming to participants that they don't want to take the time to read or even answer these postings. It is recommended to use systems that can easily divide unread postings from those already read by the participant. In an online network, where the creation of knowledge is an important part, the environment should be designed in such a way that participants construct their knowledge and learn to use tools of their culture, including language and the rules for engaging in dialogue and knowledge generation (Wilson, 1995). Perkins (1991:18) discusses five important facets of an online environment:

- *Information banks* (sources or repositories of information).
- *Symbol pads* such as notebooks, index cards, word processors, drawing programs, and database programs.
- *Phenomenaria* ("areas" for presenting, observing, and manipulating phenomena, eg. *SimCity*)
- *Construction kits* (packaged collections of content components for assembly and manipulation).
- *Task managers*, set tasks, provide guidance and feedback.

More than in face-to-face environments the online members need to make the information and communication processes of an online network explicit (de Vries and Kommers, 2005). Every thought, question, argument and discussion has to be written down. Communication seems to be much easier and more natural in face-to-face discussions than online (Wang and Woo, 2007:283). However Garrison and Anderson (2003:26) argue that writing has some inherent and demonstrable advantages over speech when engaged in critical discourse and reflection. They note that face-to-face communication is less systematic and more exploratory.

### **3.8. Closing remarks**

An important part of this chapter is comprises a review of the literature on knowledge, attitude and behaviour. Creating and sharing knowledge is a major objective in communities of practice and knowledge networks and the social component in the interaction between participants is paramount in creating and sharing this knowledge and in enhancing learning. Therefore, it was necessary to explore how knowledge sharing and creation can form beliefs of people and influence their behaviour. In the context of this case the behaviour of coaches in the use of ICT in education needed to be researched in relation to their attitude.

Knowledge determines people's attitude and behaviour. In this chapter knowledge and the way knowledge can be managed in communities and networks, was explored. Knowledge can be managed either face-to-face or online and because in this case the ICT coaches used both face-to-face and online communication, the main aspects of differences were explored in order to understand what happened in the network.

In the next chapter, the methodology and methods are described to research the importance of these factors and to research how participants behaved in the ICT coach network.

# CHAPTER 4

## Research Methodology and Methods

### 4.1. Introduction to the methodology

This chapter presents and justifies the methodology and methods that were chosen for this research.

This research primarily focussed on the role of both virtual and face-to-face networking and the way knowledge within a network was developed and used. How would the knowledge and practice about the use of ICT and teaching of the ICT coaches develop? Were the coaches able to create knowledge about ICT and teaching? The question arises, how this could be measured? Such questions can be explored in various ways.

A *positivistic* approach looks for objective knowledge which can be gained from experience or observation. Positivists believe that anything that goes beyond this knowledge is impossible (Trochim, 2006). Positivists argue that “all genuine knowledge is based on sense experience and can only be advanced by means of observation and experiment”(Cohen et al 2000:8). A positivistic approach is based on quantitative data, such as surveys and questionnaires; hypotheses are tested against these data and all scientific propositions are founded on objective knowledge, based on such quantitative data (Robson, 2002:20). Positivists believe that significant evidence about how we see the world around us is what we can see and hear (de Marrais and Lapan, 2004:108).

A *constructivist* approach would be to see the world based on our perceptions of it (Trochim, 2006). Constructivism is the development of a shared meaning of a phenomenon via interactions within a social context (Geer and Rudge, 2007). Constructivists believe that people construct knowledge based on prior knowledge and experience (Bruner, 1960, 1966) In the constructivist approach, the role of language is emphasized as an instrument by which the world is represented and constructed (Robson, 2002:25). In using qualitative methods such as interviews, focus groups and observation the research

participants are viewed as helping to construct the reality with the researcher (Robson, 2002:27)

Various writers (Barnes et al, 2010; Robson, 2002; Creswell and Plano Clark, 2007; Johnson and Onwuegbuzie, 2004) have suggested the value of a mixed method approach. A mixed method approach may focus on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies (Creswell and Plano Clark (2007: 5). According to Creswell and Plano Clark (2007: 8-10) the combination of quantitative and qualitative methods provides a better understanding of research problems than either approach alone. The authors give a number of reasons for this. Mixed methods provide strengths that offset the weaknesses of both quantitative and qualitative research. For example, in quantitative methods it is not possible to hear what people say about the questions, while qualitative research can be more subject to the researcher's personal interpretations. More comprehensive evidence can be found in using mixed methods because it helps to answer questions that cannot be answered by qualitative and quantitative approaches alone. Using mixed methods is "practical" in the sense that a researcher is free to use all methods that can address a research problem. One important benefit of multiple methods is in the reduction of *inappropriate certainty* (Robson 2002:370). When a single method is used finding a clear result may lead researchers to believe that they have found the right answer. Using different methods may point to different answers removing apparent certainty of the results. A disadvantage of the use of multiple methods is that they may produce conflicting results, which need interpretation. Another disadvantage is that each method takes time and resources to meet a professional standard (Robson 2002: 373).

As a methodology for the research a mixed method approach was chosen in which constructivist methods and positivistic methods were combined because these different perspectives enable a fuller understanding of what really happened in the network. To understand the outcomes of the survey, the network analysis and analysis of the virtual environment qualitative methods were used to enrich and explain these quantitative results because there are

more realities than this objective knowledge of the results. The study aimed to explore what the perceptions of the coaches were of the motivation and knowledge of the teachers, their own knowledge and motivation about face-to-face and virtual networking. The participants in this network had their own representation of what was happening in this network. Each participant came from a different background, a different culture and different working circumstances. This could have influenced their different perspectives and approaches in achieving the objectives of the university. The way these coaches behaved depended on their own ideas and experiences. As Robson (2002:24) argues: *“Their behaviour, what they actually do, has to be interpreted in the light of these underlying ideas, meanings and motivations”*. Using constructivist methods such as interviews, observation and focus groups enabled these different perspectives to be understood and illustrated. For example focus groups are most useful when employed with the assumption that knowledge is socially constructed and where the reality of interest is the result of social interaction (de Marrais and Lapan, 2004:89). The main reason to take this approach was that the subject matter of this research was people, in my case the ICT coaches. In using these methods the reality is presented through the eyes of the participants and the existence of an external reality independent of beliefs and concepts is denied (Robson, 2000: 25).

## 4.2. The Case Study

### 4.2.1. Case Study

According to Cohen et al (2000) a case study is a single instance of a bounded system, for example a child, a class, a school or a community. Case studies can

*..replace quantity with quality and intensify, separating the significant few from the insignificant many instances of behaviour.*

Cohen, Manion and Morrison, 2000: 185

Yin (1994) defines a case study as

*an empirical inquiry that investigates a contemporary phenomenon within its real-life context using multiple sources of evidence.*

YIN, R.K. 1994:13

Case studies can be useful in identifying important aspects of a particular context (Bliuc et al, 2007: 235) and they also provide detailed background information. Case studies can offer the opportunity of in-depth exploration and the findings may be embedded in the context. This case study was carried out in the specific context of the ICT coach network of Otto University and the collection of information took place via a range of data collection techniques, such as the baseline survey, interviews, focus groups, observation, density analysis of the network and analysis of the virtual community.

The research primarily focuses on the networking of the ICT coaches both virtual and face-to-face and the way in which knowledge within this ICT coach network was developed and used. This study explored the different perspectives and approaches of key actors and the ways in which the ICT coaches and NMG in this study worked in the network.

#### **4.2.2. Types of case study**

According to Yin (1994) there are three types of case study: exploratory, descriptive or explanatory. A case study is exploratory if it is used as a pilot for other studies. *The objective of exploratory research is to gather preliminary information that will help define problems and suggest hypotheses* (Kotler et al. 2006, p. 122): it seeks new insights, asks questions and generates ideas and hypotheses for future research (Robson 2002, p 59). Descriptive studies seek answers to questions like 'who', 'what', 'where', 'when' and 'how' and describe data about the participants in the research. The last type is the explanatory study. This type of study seeks an explanation of a situation or a problem.

Robson (2002) focuses on the participants in defining types of case study. The case study may focus on an individual, a social group, a community, organizations or institutions. It may even focus on events, roles and



relationships. This case study can be defined as an exploratory study. It describes how a network of ICT coaches was set up, what their own perspectives were, and seeks to interpret what happened in the network. In exploring what was happening, the aim was to find insights into the role of the network and answer the main research question “*What is the role of face to face and virtual networking in relation to creating and sharing knowledge for the development of ICT use in teaching?*”. The research focused on whether the participants in this network created and shared knowledge about the use of ICT in education, how the network evolved, and whether the participants acted as a social group. According to Stets and Burke (2000:225) a social group is ‘a set of individuals who hold a common social identification or view themselves as members of the same social category’. All ICT coaches in this study saw themselves as a group.

#### **4.2.3. Strengths and Weaknesses of a case study**

Nisbet and Watt (1984, in Cohen et al 2000: 184) list a number of strengths and weaknesses of case-study research. One of the strengths is that case-study research easily can be understood by non-academics because in most cases it is written in everyday, non-academic language. These studies are real and can provide insight into other similar situations. One could argue that the disadvantage of this single case study is that the study is focussed on only one group and that for this reason the outcomes cannot be generalized. But another perspective is that more detailed data and information can be gathered for analysis. The objective of this study was to understand the case and to observe the characteristics of an individual unit and to learn what critical factors are to be considered when setting up such an ICT coach network. Nisbet and Watt (ibid) argue that this is a disadvantage because the case is not easily open to cross checking and therefore may be personal, subjective or biased. Eisenhardt (1991) advocates the use of multiple researchers to diminish bias. However McSweeney and Ryan (2009: 10) argue that this is no guarantee. They advise researchers to undertake a reasonable search for contrary data or, if this is limited, review other published work about the subject.

Case studies can be very time consuming. They may involve interviewing and transcribing interviews, attending meetings and making field notes. But the advantage is that meetings can be observed in real time and in context. The underlying case here seemed to be unique at the time of research because no other ICT-coach network in relation to the implementation of different ICT applications in higher education was found in the Netherlands. However this does not mean that this case can be generalized. As Yin (1994:10) argues, case studies can only be generalized to theoretical propositions and not to populations or universes. In this case a single case study approach was designed. No data were sampled from other cases. Chapter 5,6, and 7, will show that relevant evidence is collected and that this evidence is fully documented.

#### **4.2.4. Case Study Design**

Three major stages of data collection were planned (see Figure 10). The first stage was to explore the context of the study. Four preliminary interviews were carried out to determine who the key people/players were and what issues were important. In addition, in order to draw a picture of the current state of knowledge, attitude and behaviour of the teachers and ICT coaches in the university, a baseline survey was undertaken.

This first set of quantitative data formed the input for the second stage of this case study, the individual interviews and the density analysis. To determine whether there was a significant change in the knowledge, attitude and behaviour of the ICT coaches, the last and third stage of the case study was designed. This consisted of five focus-group interviews an evaluation of the face-to-meetings, and a virtual community analysis. All methods are described in section 4.5.

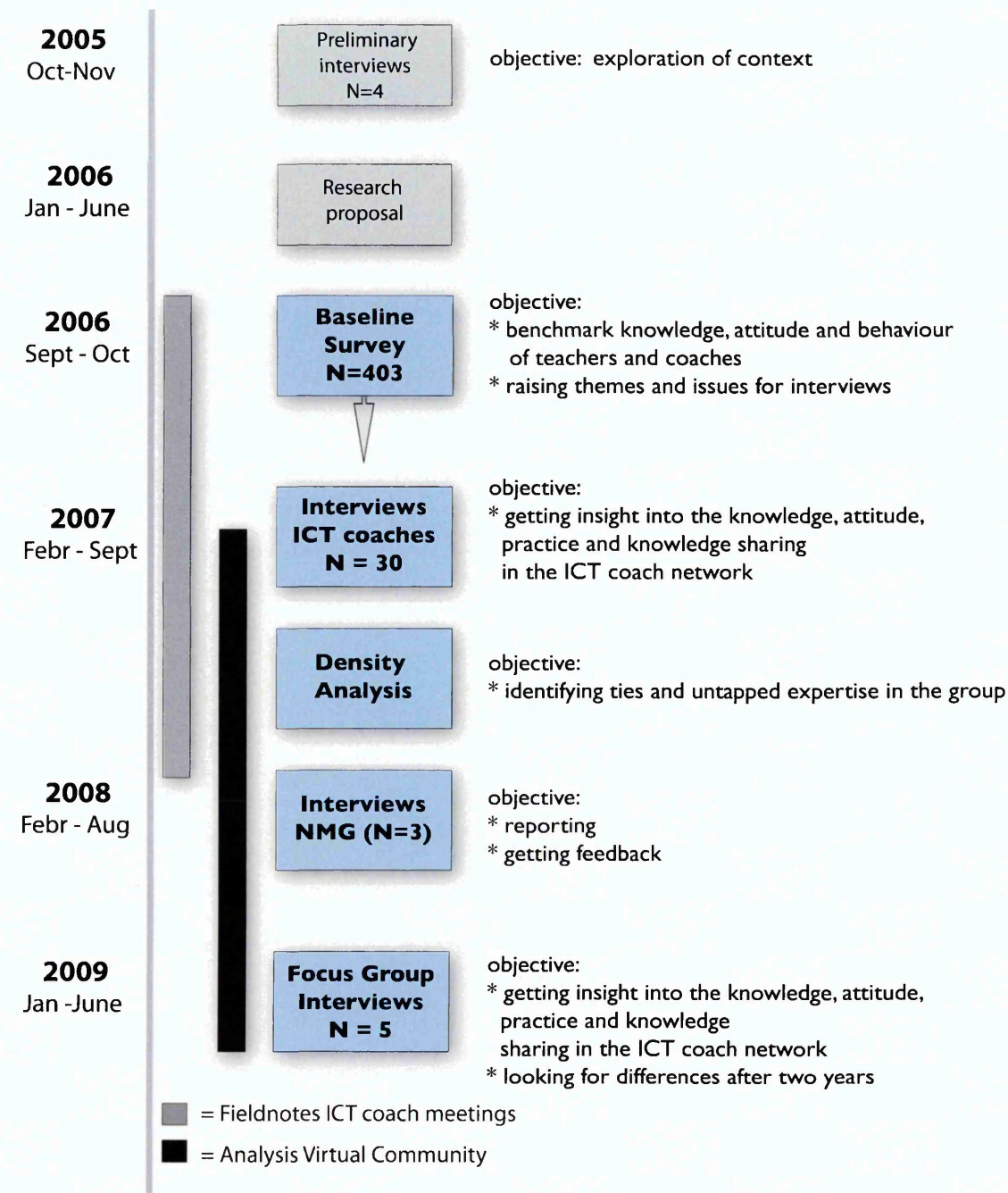


Figure 10: Case Study Research Design, Schimmel, 2012

### 4.3. Research Methods

In the first part of this section the use of the quantitative methods: the baseline survey, the density analysis and the quantitative analysis of the virtual community are described. In the second part all qualitative methods: the interviews, field notes of the face-to-face meetings and the focus-group interviews, are described.

### **4.3.1 Baseline Survey**

In November 2005, four preliminary interviews were done with staff members of the Educational Service Centre. Three of them were involved in the preliminary formation of the ICT coach network and one was a Unit Manager for Internet & Media of the university. All four respondents were directly involved in projects about ICT and learning. The interviews were exploratory and informal and no interview protocol was made. The main purpose for these interviews was to explore the projects in the university with regard to the implementation of ICT in education. One of these projects was the formation of an ICT-coach network and the building of an Intranet with projects about ICT and education. The main objective for both the ICT-coach network and the knowledge net of the Intranet was to create and share knowledge about the development of competence-based learning with the help of ICT. In the vision of the university, the growing importance of ICT in daily life makes it important to integrate ICT into the course curricula and students, teachers and administrators should work together to develop ICT in education (see also section 1.4).

An online survey was undertaken in November 2006 to draw a picture of the current state of the knowledge, attitudes and behaviour of the teachers in the university about the use of ICT in education.

#### **Design and procedure**

Three sources were used to shape the questionnaire (see appendix 6). The first source was the four preliminary interviews with staff members of the Educational Service Centre. From these preliminary interviews, information was gathered about the structure of the organisation and the main objectives of the ICT-coach network. The second source was the questionnaire which was used for a survey "ICT Education Monitor 2003" (Kennisnet ICT, 2003) among teachers of higher education in the Netherlands. This survey is held every two years in the Netherlands among teachers of universities and vocational institutes of higher education. From this survey, questions were used about the motivation of the teachers to use ICT and their perception of the usefulness of ICT in their curriculum. The third source derived from the

research of Weistra (2005) in which he used questions to determine the maturity levels in the use of ICT as defined by Itzkan (1994). In this model Itzkan (1994) distinguishes three maturity levels for the development of innovation in education: substitution, transition, transformation (see also chapter 2)

From the research of Weistra (2005) two questions were designed to identify how teachers used ICT in their curriculum and to determine the maturity level of teachers at that moment.

The questionnaire was based on three themes:

*Knowledge* in terms of what teachers knew about the use of ICT in education, how experienced they were to work with ICT and which computer programs they used in their lessons. In this section questions were asked about the teachers' experience with computers, the use of e-learning environments of the university and the use of digital portfolios and digital assessment programs. Also questions were asked to determine the perceived experience of the teachers with specific software or applications on the Internet that are used by young people such as MSN, Skype, Blogs, Wiki's.

*Attitudes* in terms of how motivated the teachers were to use ICT in education and how willing they were to change to a new way of working in the university. Teachers were asked about their attitude regarding the usefulness of ICT in education and about their motivation to learn new technologies with computers. Their use of knowledge resources was researched and also their motivation to share this with others in the organisation.

*Behaviour* in terms of what the teachers actually did with ICT, and how integrated ICT was in their educational practice. The teachers were asked to describe their experience and use of the e-learning environment Blackboard. Teachers' behaviour and development in ICT and learning was surveyed on the basis of the model of Maturity Levels from Itzkan. In this section there were also questions about the extent to which the knowledge net and the Intranet of the university were used and perceived to be useful.

The survey had two versions, one for the teachers of the university and one for the ICT coaches. In both versions 24 questions were the same. In the version of the ICT coaches, seven more questions were added about their motivation to participate in the ICT-coach network and their expectations about the results.

### **Pilot Survey**

Both editions of the questionnaire were hosted on the Internet in the software application “Netquestionnaires” (<http://www.netq-survey.co.uk/>) . This software allowed respondents to fill in the questionnaire online. Although the questionnaire was hosted on the Internet and could easily be used online, all respondents also were enabled to use a hard-copy document. The questionnaire was discussed with supervisors and advisors and also with three staff members of the NMG. After building the questionnaires into the software application, the final questionnaire was tested with six teachers in a real setting online. As a result of their feedback minor amendments were made, mainly in the layout of the screens online and some wording of the questions.

### **The Survey**

All teachers were selected from the staff database of the university to make sure that only teachers were invited to participate in the survey. The list of ICT-coaches was matched with this list to avoid sending the wrong URL to the respondents to fill in the questionnaire online.

In an e-mail all teachers and ICT coaches of the university were invited to participate in the questionnaire. To enhance the response, all respondents who completed the whole questionnaire were given a chance to win two theatre tickets in a prize draw.

The teacher population consisted of 1425 teachers of five faculties within the university and 22 ICT coaches, who are also teachers at the university. 403 completed questionnaires were returned which constitutes 27.6% of the population in a representative participation of all the five faculties. This was checked with the real population of teachers at each faculty as shown in Table 4.1 below.

Number of participants	Population	Percentage	Sample	Percentage
Faculty A	396	27,8%	98	24,3%
Faculty B	277	19,4%	82	20,3%
Faculty C	203	14,3%	49	12,2%
Faculty D	473	33,2%	145	36,0%
Faculty E	76	5,3%	29	7,2%
<b>Total</b>	<b>1425</b>	<b>100,0%</b>	<b>403</b>	<b>100,0%</b>

Table 3: Number of participants baseline survey

At the time the questionnaire was used, only 22 ICT-coaches were active. 14 ICT coaches took part in the survey. Because of the small sample the results were used as an indication to set up the interview schedule with the ICT-coaches.

### Analysis

The analysis of the survey was done with the built-in tool of the software application Netquestionnaires. This tool has the same major functionalities as SPSS, cross tabulations can be made and the tool generates statistics in tables and graphics.

#### 4.3.2. Social Network Analysis

To understand how people work together in a network or a community, and how knowledge flows through these networks and communities, a social network analysis (SNA) can be performed. A social network analysis is a technique to analyse the strength and weaknesses of the network and to map the knowledge in an organisation (Chan and Liebowitz, 2006:19). Such a Social Network Analysis (SNA) provides a rich and systematic means of assessing informal networks by mapping and analyzing relationships among people, teams, departments or even entire organizations (Cross et al, 2001:103). An SNA map is an instrument to see how knowledge flows in organisations. It can illustrate in more depth which persons contact and exchange knowledge with other persons in the organisation. According to Davenport and Prusak (2000:72) such maps point to knowledge but do not contain knowledge. They are guides, not repositories. Knowledge maps

provide a systematic way to access the efficiency of how knowledge flows (Chan and Liebowitz, 2006:21). This can be done by a SNA. Such an analysis focuses on the relationships that people in a network have, what the frequency of their contacts is and what knowledge participants exchange. Scott (1991) has defined three types of data to use in SNA. These are:

- Attribute Data (relate to attitudes, opinions and behaviour of members)
- Relational Data (contacts, ties and connections, group attachments and meetings)
- Ideational Data (describe meanings, motives, definitions)

The attribute and relational data are most widely used in analysis.

Moreno (1934) defined a so called “sociogram” in which he visualized the channels through which, for example, information could flow from one person to another and through which one individual could influence another.

According to Scott (1988:113) a simple sociogram of a network consists of a set of points connected by lines. A small example of such a network is pictured below:

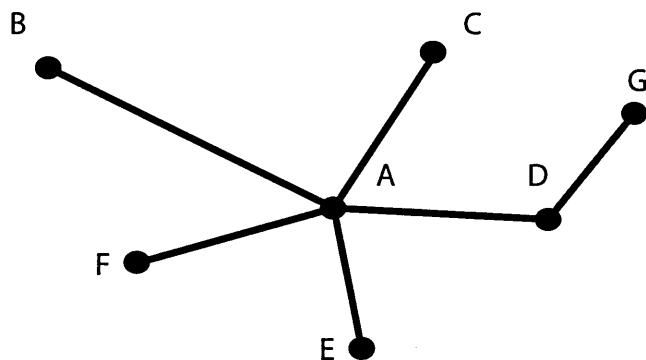


Figure 11: Example of Sociogram, Scott, 1988

To collect data Hanneman (2005) defines four strategies:

**Snowball Method.** This method begins with a focal actor who names some all of his ties. These ties are asked for their ties. This is continued till no new ties are discovered.



**Ego-centric network** (with alter connections). This is an alternative approach from the snowball method and begins with a selection of focal nodes (egos). This method can be used in large populations.

**Ego-centric networks** (ego only). This method focuses on the individual and not on the network as a whole in order to understand how networks affect individuals. Members of networks are asked to evaluate their connection to others in the network. After that the structure of the network is mapped in to 'ties' (who is connected to who) and into 'weights' (how strong is the relationship)

**Full Network Method.** Collecting data about the ties of actors in the network in relation with all other actors in the network. This method gives a complete picture of relations in the population. In this method data is obtained from every member in a population where members of the network rank or rate every other member.

In this case study a full-network method was used to analyse the ICT coach network. The findings are described in Chapter 7.

A "Density Analysis" can be used as a part of a Social Network Analysis in which respondents are asked: "Which of the following do you regard as a friend?" or "With whom do you have regular contact about your work?" (Scott, 1991). Such a density analysis involves calculating the number of lines in a network, divided by the maximum of all possible lines (Scott, 1991). The density analysis maps how actively the members are involved in the discourse and gives an indication of the level of engagement in the network. According to Cross et al (2001:103) Social Network Analysis is used to map information flow, but also to assess the relational characteristics of knowledge, access, and engagement in a group. Such a Social Network Analysis (SNA) provides a rich and systematic means of assessing informal networks by mapping and analysing relationships among people, teams, departments or even entire organizations. The Social Network Analysis helps to identify any peripheral people who represent untapped expertise and thus underutilized resources for the group. The density of a network determines how strong relationships are

in a network. Other key dimensions in a network are: network size - the number of people involved; network constraint - the extent to which contacts are redundant; and the network hierarchy, organized around a senior hierarchical position (Hislop, 2005:246).

### Design and Analysis

The creation of the density analysis was partly based on the work of Cheuk (2006). In this case only relational data were gathered such as the ties and connections between coaches. At the end of each interview the ICT coaches were given a spreadsheet with the names of all the ICT coaches in the university. The respondents were asked to state which of the coaches they knew and with whom they had contact or exchanged information. The answers were classified with points. The more contacts an ICT coach had in the network, the more points they were given. The names of 31 coaches were on the spreadsheet, 6 coaches from faculty A, 8 coaches from faculty B, 6 coaches from faculty C, and 11 coaches from faculty D.

Three questions were asked.

1. With which ICT-coach have you had contact since the start of the network? 1 point

2. To whom do you send and from whom do you receive information about the ICT-coach network

1 = every two months -1 point

2 = every month -2 points

3 = weekly -3 points

4 = daily -4 points

3. With whom do you discuss issues about the ICT-coach network? - 3 points

The total points were set out in a spreadsheet in two dimensions (see Table 4.2). On the horizontal row all the points were placed from the answers that the interviewee had given. The points on the vertical row are the answers from the other coaches.

	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33							
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11								
A1		6	8	7	5	6									1																		33	41					
A2	7		7	7	7	7							3										1		1									41	43				
A3	7	6		7	6	6							2																						34	36			
A4	8	8	8		8	8	1	1	5		1	5		6	1												1		1						62	34			
A5	7	7	7	3		3																														27	33		
A6	5	5	5		5								1		1																					22	33		
B1							8	6	6	8		2	8			3		4	5							2		6								58	46		
B2							8		7	5	7	2	2	7									2			2						2				44	45		
B3				1			3	5		7	6	3			1	1					1	1				1										30	55		
B4							6	6	8		7	5																									32	20	
B5							5	5	5			7		4	4																						23	45	
B6							4	1	1		1				4								4		4	1	4							1			29	12	
B7	5	2	1	1	1	1	4	1	4	1	5	5			4	4	1	1	1	1	2	2	1	1	5	5	1	1	1	1	1	1	1	1	65	78			
B8							5	7		1	5		4																				4				26	25	
C1	1						1	2		1	1	4			6	6	1	5	1				1														24	41	
C2				5			1	1	1	1	1				6		5	1	4								1										28	23	
C3												2				3		4	4																			13	20
C4							1					2			2	2	7		7	1	1												1				24	22	
C5									2			3			2	2	6	7																			22	22	
C6	1				1	1						1			1	1																					6	2	
D1			3		1	1	1	3				3											1		5	6	6		1			5				36	23		
D2		2					2	2			2	2			2							2		6	2		6	6	6							40	42		
D3												3	5	2									1	1	1							5				19	20		
D4		6					2	2							5	2									6	2											25	30	
D5												5																									14	25	
D6		1					1	1	1			1	5		4								4		5	8										36	30		
D7							2	2			2	2												6	6	2	1	2									33	31	
D8							4		6		1	4		2										7	5	1		2	6			7				45	43		
D9												4		3										3		7											17	8	
D10												2													7	2			7	7							25	14	
D11							1	1																	6	4	1	2									22	13	
	41	43	36	34	33	33	46	45	55	20	45	12	78	25	41	23	20	22	22	2	23	42	20	30	25	30	31	43	8	14	13	31	31						

Table 4: Spreadsheet of density analysis

This results in two totals. The horizontal numbers are totalized with a number in red, the vertical numbers are totalized with a number in blue. Analyses were made on the number of contacts that an ICT coach had inside and outside his faculty. The same analysis was done on the number of contacts inside and outside the faculty that other ICT coaches stated they had with this ICT coach.

After completing the spreadsheets, a graphical display was made for the total network and the underlying networks of the faculties. These graphics were made with the UCINET software. The findings of the density of the network are described in Chapter 7.

### 4.3.3 Virtual Community Analysis

Apart from the face-to-face contact which the coaches had and which are described in the density analysis, the coaches had virtual contact in a web-based community. This community was launched in September 2006 to support the network of ICT coaches. In the functional design of the website, one of the objectives was to integrate the site with a weblog that was to be developed. The community was established to support the ICT coaches with documents, tutorials and training material, which could be used in their daily practice as ICT coaches. The ICT coaches were supported by the Network

Managing Group (NMG) who were responsible for the moderation and maintenance of the online community. In the beginning, the staff of this group uploaded documents and material and there was no interaction possible by the coaches. When new content was submitted to the online community, the coaches were informed by e-mail. After a first evaluation of the online community a weblog was added to the community in January 2007. The main reasons for this were:

- to make announcements and give news about the network.
- to offer ICT coaches the possibility to react to information and/or questions to enhance interpersonal consultation and support.
- to serve as a knowledge repository by storing documents chronologically and categorizing them into key themes.

In December 2007 a report was published (Schimmel, 2007) that showed that the majority of the ICT coaches rarely used the online community. From the respondents that had used the online community, only one of them confirmed that they had downloaded a document. To promote a more active use of the online community and to enhance the communication between the ICT coaches, the NMG stopped using the weblog at the beginning of the academic year 2008/2009. All communication between the NMG and the coaches should now take place in a new online community which was launched in September 2009. The new website, which was called the ICT-coach community, was filled with training material and information about the meetings of the ICT coaches.

For the analysis of the online community a framework was developed to determine the users' communication activity levels. This framework was based on the research of Schoberth, Preece and Heinzl (2003). In this framework two indicators are used to measure the activities in the community:

*The Relational Communication Activity.* The mean number of messages in a thread were measured and the number of established threads. An established thread is a thread with more than one message.

*The Attributive Communication Activity.* The mean number of messages per user and the relative standard deviation of messages per user.

The evidence of activity in the community was collected by means of a weekly update of all postings in the community which was sent by an email alert. The community was based on Microsoft Sharepoint software which enables users to set alerts in their e-mail box to see what new contributions have been made. Users can set preferences in the frequency of these alerts, varying from direct alerts to weekly or monthly alerts. All contributions of threads, announcements, discussions and documents were copied into an Excel worksheet on a weekly basis. All activities in the ICT-coach community were measured from the start of the community (August 2008) until the 1st of September 2009. The results are reported in chapter 7.

#### **4.3.4 Interviews**

One of the issues that came out the baseline survey was that ICT coaches were rather sceptical about their mission to motivate and train the teachers of the university. To explore how motivated these coaches were and how they would share and create knowledge in the network, each ICT coach was interviewed. The interviews were used to get more insight into the knowledge, attitudes and behaviour of the ICT coaches with regard to the use of ICT in education, and to explore the working of the network. According to Robson (2002) “the interview is a flexible and adaptable way of finding things out”. It allows the interviewer to observe as well as listen. Because it is flexible, more subjects can be covered during the interview. Although interviewing is very time consuming and needs a lot of preparation, it gives more qualitative information about the issues that are researched. Yin (1994:80) describes bias as a weakness in interviews due to poor questions. For example when the interviewee expresses what the interviewer wants to hear. Semi-structured interviews were used. The advantage of using semi-structured interviews is that they can be combined with other methods (such as questionnaires) and are a flexible way of interviewing since questions can be adjusted responsively during the interview. The conversation during the interview can have a more informal character. The researcher’s concern is to

cover all the themes for questioning. Although it is possible to formulate a range of questions beforehand, it is possible to move between questions in a flexible way. In a more structured approach the interviewer is restricted to the questions that have been pre-determined and there is no room for interaction by the respondent. The unstructured interview has the danger of the interview being led too much by the agenda of the respondent and it is possible to forget questions or easily skip key issues (Kvale, 1996).

### **Structure of the Interviews**

The results of the baseline survey in subsection 4.5.1, and especially the part in which the ICT coaches participated, were used for the construction of the interview questions (see Appendix 1).

The interview consisted of three sections of questions. These three main sections were:

#### *Current job and experience*

These questions dealt with the current job at the university and the experience of the coaches with ICT. In order to understand what knowledge the coaches had of the development of ICT in education and to determine what their attitude was about the use of ICT in education, questions were asked about their own experiences with ICT and what specifically motivated them to be an ICT coach. Whether the coaches were technically-oriented or pedagogically-oriented in the use of ICT could have influenced their attitude to the use of ICT in education and their perception of how teachers in the university were motivated to use ICT in their teaching practice. A specific question in the interview dealt with their view on the use of ICT in education. The coaches were also asked why they thought they were asked to be an ICT coach and about their first impressions of the motivation of the teachers to work with ICT in education. The implementation of new ICT applications and the objective of the NMG to ask the ICT coaches to train teachers and to transform their education with the use of ICT made it necessary to ask them how much support the ICT coaches got from their manager in this change process.

### *Working in the ICT coaches network (face-to-face and virtual)*

In this part of the interview respondents were asked how the coaches perceived their participation in the network. In order to give an answer to the main research question on what the role of face-to-face and virtual networking was, questions were asked about the way in which the coaches worked and whether they were satisfied with that. Specific questions were asked about the way they worked either face-to-face or virtually in the network. Their participation in the network was explored by asking them questions about the frequency of their meeting and the use of the virtual community, the weblog and the knowledge intranet of the university, and why (or why not) they met face-to-face or virtually

### *Knowledge Sharing, Knowledge creation*

In order to understand how coaches perceived the knowledge of the domain of the community, questions were asked about their vision on the use of ICT in education. Did the ICT coaches have a shared vision how ICT should be used in education at Otto University? To give an answer to one of the additional research questions: *“How is knowledge created and shared with regard to the use of ICT in teaching”?* coaches were asked their opinion on the best way to share knowledge with other colleagues and whether the virtual community environment played a role in the knowledge creation of the ICT coaches. Furthermore they were asked what was the best way to share their knowledge on ICT in general and in education in particular.

At the time of the interviews there were more ICT coaches active than the twenty-two coaches who participated in the baseline survey. The sample for the interview consisted of 31 ICT coaches from the four faculties of the University; 6 coaches from faculty A, 8 coaches from faculty B, 6 coaches from faculty C and 11 coaches from faculty D.

### **Analysis of the interviews**

For the analysis of the interviews a deductive approach, as outlined by Crabtree and Miller (1998), was taken by constructing a template to analyse all interviews. Crabtree and Miller (ibid) give three ways to analyse

qualitative data: the Immersion or Crystallization style; the Editing style; and the Template Organizing Style. The Template Organizing Style (Crabtree and Miller, 1998) was used as a process in which a template is used in the form of a so-called codebook. In reading and analysing the transcribed text of interviews a good thematic code is essential to capture the quantitative richness of the phenomenon (Boyatzis, 1998:31). A schematic example of Crabtree and Miller's method to construct a template is showed below.

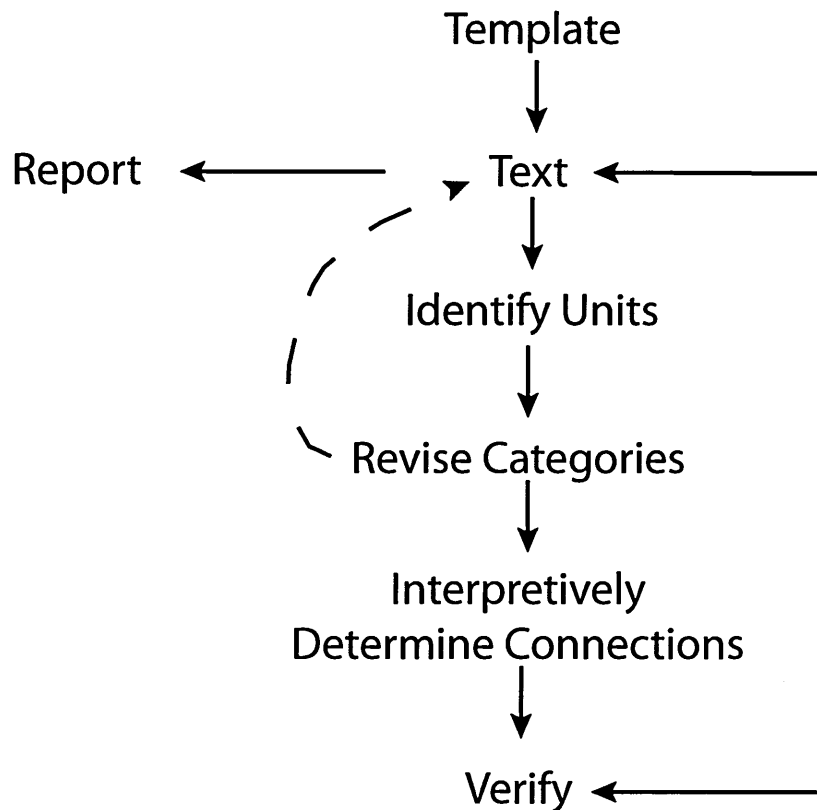


Figure 12: Template Analysis Style, Crabtree and Miller, 1998

A template was defined with codes and when reading the text of the first interviews the text was coded. The template was based on the interview schedule. A list of 43 codes (see appendix 2) was used to get a detailed picture of the findings of the interviews and the Focus Group Interviews. A number of these codes marked socio-demographic elements such as age, gender, faculty membership. Others marked the respondents' qualifications and use of ICT applications in the university. After collection all qualitative data were analysed for a second time. The first analysis showed that some



codes were overlapping others so the categories and codes were revised during the second analysis (appendix 3). A set of broad categories (Knowledge-Attitude-Behaviour, Change management, Building community, Critical Success Factors and Faculty Membership) was made. These basic codes and categories were based on theoretical understanding and the interview guide which was used during the interviews. Some codes were expanded and rearranged after reading the text. All interviews were in Dutch and therefore also the code manual was developed with Dutch categories and key words. Table 5 shows an example of an English translation of a label in the category “Knowledge”

Knowledge	
<b>K1</b>	ICT coaches' knowledge of his/her assignment in the ICT coach network
Definition	Do ICT coaches have knowledge of their assignment, task or the objectives of the ICT coach network?
Key words	Assignment, task, job profile, hours, support to teachers, training, job description.
Dutch key words	Opdracht, taak, baan, profiel, uren, ondersteuning, training, taakopdracht
Exclusions words	Strategy, policy, vision on ICT
Examples	<i>Yes, there is not even a clear picture of the hours, in other faculties they have 200 hours and other have 80. There is no common procedure for that? No, they have not made clear procedures for that. And this is very variable.</i>

Table 5: Example of code label

The codes were used as a data management tool. This was done with the help of the software program ATLAS.ti©, a software program for the qualitative analysis of large bodies of textual, graphical, audio and video data. ATLAS.ti works well for a straightforward and simple sample (Barry, 1998) and is very easy to learn. Within ATLAS.ti it is possible to code each phrase, word or sentence and export each code into a new document. For each code all the quotes of the interviewees were exported into one document. This helped to discover patterns in the outcomes of the interviews.

All interviews were recorded and transcribed in the original Dutch language. The findings, as reported in Chapter 6, are reported in English. In translating original Dutch quotes into English, some of the richness of a typical Dutch

expression was lost. It was aimed to translate these quotes as accurately as possible. It is believed that these translations did not affect the general analysis of the case.

#### **4.3.5 Focus Group Interviews**

A focus-group interview is ‘a technique involving the use of in-depth group interviews in which participants are selected because they are a purposive, although not necessarily representative, sampling of a specific population, this group being ‘focused’ on a given topic’ (Thomas et al, 1995 in Rabiee, 2004: 655). In the definition of Kitzinger (1994:103) ‘focus groups are group discussions organized to explore people’s views and experiences on a specific set of issues’. Focus group interviews were first used in market research based on the fact that consumers make their decisions in a social context (Robson, 2002:284). In a focus group the respondents are interviewed about a certain topic of which is the ‘focus’ of the research. By using a focus group interview the researcher is able to better understand how people think or feel about an issue, product or service (Krueger, 2000). More than in group interviews, focus groups are more reliant on the interaction within the group (Cohen et al, 2000: 288). This allows the views of the participants to emerge more than the agenda of the interviewer and the data can be richer.

Robson (2002: 284) gives a list of advantages and disadvantages in using focus group interviews. One of the important advantages is that focus group interviews can save time because the researcher can collect data from several people at the same time. Also, because of the time saving aspect, group interviews are relatively inexpensive. Because of the group dynamics the interactions of the group are often deeper and richer (Rabiee, 2004: 266), but careful management can help also to focus on the most important topics. The focus group interview is a more natural environment than that of an individual interview because participants influence and are influenced by others (Krueger, 2000). People who are not willing to contribute in individual interviews can be encouraged to participate in a group. Kitzinger (1994) argues that one can best work with pre-existing groups. These groups provide the social context in which decisions are made. On the other hand, there may

be conflicts between respondents or conflicts of status. If one or two people dominate, the results might be biased. To prevent this, the role of the group facilitator is important. He or she should *'create an environment in which participants ....feel relaxed and encouraged to engage and exchange feelings, views and ideas about an issue'* (Rabiee, 2004: 656). Because of the richer interaction of focus group interviews, the interviewer should be aware of the fact that the number of questions is limited. Kitzinger (1994) describes significant advantages that are gained from interaction between participants: it encourages a great variety of communication from participants; it provides insight into the operation of the group and social processes in the articulation of knowledge; it helps to identify group norms; and it highlights the respondent's attitudes, priorities, language and framework of understanding.

In order to identify whether the ICT-coaches in this case study had changed their attitude and behaviour with regard to their participation in the ICT-coach network, five focus-group interviews were held in the spring of 2009, one in each of the faculties, and one with the Network Managing Group. The Network Managing Group was responsible for the coordination of the training of the ICT coach network and the moderation of the virtual community. In total 22 coaches participated in the group interviews. The number of participants was 5 (faculty A), 5 (faculty B), 5 (faculty C) and 7 at faculty D. The last interview was with the NMG, in which 5 employees participated.

All focus group participants were given a pre-questionnaire (Appendix 4) to use during the interviews. This helped them to express their own point of view and also led to more commitment to contribute to the group. Two coaches, who cancelled their participation shortly before the interviews, were also asked to fill in this questionnaire. On the pre-questionnaire, a declaration of the ethics was given about the use of these interviews, based on the British Educational Research Association guidelines and permission was asked to record the interview. It was stated that all data were only to be used for this research and would not be used for other purposes. In any document about these interviews quotes, from of individual respondents were to be reported anonymously.

The interviews were clustered around four themes:

### *1. Knowledge of the task of the ICT coach*

What do you regard as the most important task of the ICT coach?

Are there other tasks that are specific for this job?

Is there any policy concerning of what you as a coach should achieve?

### *2. The support to the ICT coach*

What support do you need in your job as ICT coach?

What support do coaches get from their manager?

What is the role of the NMG?

### *3. The attitude of the ICT coach*

To what extent do you think that your job as ICT coach has resulted in better use of ICT in education?

If you had the choice yourself, would you spend more time as ICT coach?

How much interest is there among teachers to attend your training sessions and does this affect your work as an ICT coach?

### *4. Behaviour; knowledge sharing face-to-face or virtual*

How important do you think knowledge sharing between the ICT coaches is?

How does this take place? And what do you share?

What kind of knowledge is exchanged between faculties?

What is the role of the new virtual community?

The interviews were semi-structured. Questions appeared in different sequence during the interview. Each interview took approximately one hour and was audio recorded.

#### **4.3.6 Interviews with the Network Managing Group**

Interviews were held with staff members of the Network Managing Group. The main objective of these interviews was to explore the views of these staff members about the main objective of the NMG and their knowledge of the university's strategy with regard to the use of ICT in education. These interviews were held to answer the following questions:

- Is there a shared vision and strategy about the use of ICT in education?

- What was the main objective of the Network Managing Group to start the network?
- Have measurable indicators of success been formulated?
- What does the respondent think of the working of the network so far?

One year after these individual interviews, a focus group interview was held with five members of the Network Managing Group. Questions were more or less the same as the themes that were covered in the focus group interviews with the ICT coaches. Specific questions were asked about the use and purpose of the virtual community, the way the NMG tried to promote the use of the virtual community and the motivational aspects of knowledge sharing and knowledge creation.

#### **4.3.7 Field notes of face-to-face meetings**

The ICT coaches in this study were trained in the use of the ICT applications which are used for teaching. An average of four meetings a year were organized in which the coaches could meet each other. During a period of three years six of these meetings were attended. The main purpose of this activity was to get to know the coaches, to get a picture of their activities and the issues discussed between them. Furthermore, it was important to get an idea of the motivation of the coaches to attend the meeting and about their attendance in general. During the discussions field notes were made. An example is given in appendix 5.

A main activity during the meetings was to train the ICT-coaches in skills in the use of the new e-learning environment, the use of a digital assessment program, the use of digital portfolios and the use of a student information system. After this train-the-trainer course, the ICT-coaches were expected to be able to train their colleagues in the same skills to use the programs.

Another purpose of this training was to help the ICT-coaches to construct a wide variety of training sessions about ICT and learning and to evaluate the ICT applications and the way they were used. The participants evaluated each training session. Not only did they evaluate the specific training but also, at the end of each part, they discussed their own role, the training material and

the support from the university network coordinators. In addition to these training sessions the coaches were invited to thematic meetings for special interest sessions such as on the use of video in teaching.

During the meetings field notes about the issues discussed were made, and also field notes about the evaluation discussion at the end of each session. Some of the issues that emerged were used in the individual and focus group interviews. Before each meeting the researcher's role was explained as an observer to the ICT coaches. Gold (1958, in Cohen et al, 2000:305) describes four roles as observer: the complete participant, participant as observer, observer as participant, and the complete observer. The first two roles were not possible since the research had a fulltime job in addition to the role as researcher. In the last role, that of complete observer, it was not possible to have contact with the group so that they did not realize that they were being observed. The best role for the researcher was to be an '*observer as participant*'. In that role the observant was known as a researcher and had less intensive contact with the group. Looking at the program of the training sessions of the ICT coaches, the most interesting part of these sessions showed to be the end of the meeting, where participants evaluated and discussed the training and the future training with the teachers. Field notes with reflections were made after each session that was attended. These notes were written down in a narrative account after each session.

#### **4.4. Validity and Reliability**

*Validity* in research is the concern to ensure that the findings are really about what they appear to be about (Robson, 2000: 93) or the closeness of what we believe we are measuring to what we intended to measure (Roberts and Priest, 2006: 41).

Joppe (2000) explains validity in research as follows:

*Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull's eye" of your research object? Researchers*

*generally determine validity by asking a series of questions, and will often look for the answers in the research of others.*

Joppe (2000)\*

Using triangulation can help counter the threats to validity (Robson, 2000:175). Cohen et al (2000: 112) describe triangulation as “the use of two or more methods of data collection in the study of some aspect of human behaviour”. Triangulation can be carried out using both quantitative and qualitative data: as Cohen et al (2000:112) argue, “*the more the methods contrast with each other, the greater the researcher’s confidence*”. Another advantage of using more than one method is that different but complementary questions can be addressed (Robson, 2002: 371). Triangulation is used to prevent bias in relying on the use of only one method. For example, in using quantitative methods in the survey and density analysis, the interpretation of statistical analysis may be enhanced by a qualitative narrative account (Robson, 2000:371). In this study triangulation was used for this purpose and also to verify some of the outcomes of the baseline survey in the interviews with the ICT coaches. Furthermore data gathering was done at different times using the same questions and with the same participants (interviews and focus groups).

*Reliability* is defined by Cohen et al (2000: 117) as “*consistency and replicability over time, over instruments and over groups of respondents*”.

Reliability means that significant results must be inherently repeatable (Shuttleworth, 2008), that is, if data were gathered under the same conditions again, it would generate the same results. Reliability of quantitative data requires that research tools should give the same information if used by a different person or used in a different day of the week (Roberts and Priest, 2006: 42). In qualitative research, reliability is expressed in terms of broader concerns about the trustworthiness of the procedures and the data that are generated (Stiles, 1993).

*Validity of the methods used.*

In the individual interviews all ICT coaches (31) were questioned and in the focus group interviews 70% of the ICT coaches equally divided over the faculties participated. It was aimed to ensure validity of the qualitative methods by supportive quantitative methods such as the combination of focus group interviews and a questionnaire that was filled in before the interview, and a combination of the personal interviews with the density analysis. All qualitative research is biased, the researcher, the participants and the readers can have a selective perception of situations (Stiles, 1993:613). In this study it was aimed to reduce bias by getting a wide coverage of the population which was a representative group. Furthermore the researcher asked the respondents to be honest and explained that he was an outsider in the university in this case. Although the interviews took place in an informal semi-structured way, the researcher was not able to share personal experiences with the respondents and influence their responses because he had no experience as a teacher or ICT coach and had no knowledge of the used applications. The respondents were ensured that data would be anonymised and only owned by the researcher. The researcher had no influence in the place or room where the interviews took place.

Validity of the quantitative methods (the baseline survey), was ensured by using a sample that was representative of the researched population and which was not too small and not too large (see subsection 4.5.1). For the density analysis and the quantitative analysis of the virtual environment, the total population of the coaches was taken.

#### *Reliability of the methods used.*

Reliability and consistency of the questions in the baseline survey was tested in the real virtual environment with advisors and nine members of staff in order to check whether respondents understood the questions and whether respondents understood the ways the questions could be filled in. The reliability of the qualitative methods used (interviews and focus group interviews) was ensured in audio recording all interviews, fully transcribing them and coding of all the data. Qualitative data of the group interviews was gathered in two different ways with the same questions, a pre-questionnaire



and the actual group interview. To assure the reliability of this case study, all steps of data collection and procedures were fully documented.

## **4.5. Ethics**

### **4.5.1 General ethical considerations**

The ethical issues of this case study were considered in the design of the study. According to Allchin (1988) a researcher is an ethical agent who is responsible for all the consequences of his actions, good or bad. A researcher can have ethical dilemmas (Cohen et al, 2000: 61). Key dilemma was the privacy of the participants in reporting the information which the researcher had gathered in interviews, meetings and the survey. Before each interview and focus group interview this issues were discussed in advance with individual participants. The respondents were assured that the findings would be reported anonymously, and were told how the researcher would cope with sensitive information. As Cohen (ibid) states: *“The essence of anonymity is that information provided by participants should in no way reveal their identity”*.

Participants could not expect to be interviewed anonymously; however in my case non-traceability was ensured in deleting identifiers such as names and institute and replacing them with codes.

### **4.5.2 Practical ethical issues in this study**

One of the main issues in this case study was to get institutional ethics approval. The methodology and design of the case study was discussed with the university in which the research took place and written approval was given by the university. In the baseline survey, a declaration was made about the anonymity of each respondent. In the interviews and focus group interviews each interviewee was asked to agree to the recording of the interview and was guaranteed that all data would be confidential. The university and participants were informed that the researcher would be the owner of the results, and the results were only to be used in relation to the research study. In all reports and in this thesis, quotes of respondents were disguised by giving respondents a code number consisting of a faculty number

and a respondent number. In several stages during the research, findings of the results were reported to the Network Managing Group with the agreement of all participants. The reporting was done in such a way that quotes could not be traced to individual coaches. The building of trust in this respect was essential. A declaration was made to the respondents that if the results were to be used in any other context, the participants would be informed and asked for their consent. They all agreed with that. The researcher did not actively participate in the group of ICT coaches. From the very beginning the ICT coaches were aware that the researcher could be present in meetings to observe what was going on in the meetings and which topics were discussed. Before each meeting an approval was asked from each participant for the researcher to be present and to make notes.

#### **4.6. Closing remarks**

In this chapter the use of the research methodology was justified. The main methodological issue was the choice of a mixed-method approach in which constructivist and positivistic methods were combined. The chapter aimed to justify that the methods used were valid and reliable. Ethical issues were discussed with the university in which the research took place and a written ethical approval was given. In the following chapters, the findings of the methods that were described in this chapter are reported.

# CHAPTER 5

## Digital teachers and digital ICT coaches

### A Baseline Survey

#### 5.1. Introduction

A baseline survey was undertaken at the start of the research. The objective of this survey was to describe the current status of knowledge, attitudes and behaviour of teachers and ICT coaches with respect to ICT and learning. Besides the practical knowledge of teachers about ICT and learning, the survey investigated the use of knowledge resources about ICT and the motivation to use ICT in teaching practice. Chapter 4 describes the design and procedure of this survey.

At the time the baseline survey was held (2006), the university had five faculties; faculty A (Business Administration), B (Education), C (Engineering), D (Development and Society) and E (the Academy of Information and Communication Technology ). In 2008 Faculty E merged with faculty C. During the next stages of the research this fifth faculty was a part of faculty C and only one ICT coach of that former faculty was active. This had no significant influence on the findings as described in chapter 6 and 7.

#### 5.2. Teachers skills in the use of computer programs

Respondents were asked how they perceived their skills in the use of computers. 55% of the respondents reported that they were average users of computers (Table 6), and knew how to work with computers. 23% of the teachers reported that they were very experienced users of computers. This group said they knew most possible applications that were used in the university. From this group of skilled users, men were significantly more represented than women, 67% were male and 33% were female. From the total group of teachers 78% said they were experienced users of computers. In faculty A and D these numbers were slightly lower, in faculty B and C they were higher and in faculty E they were significantly higher.

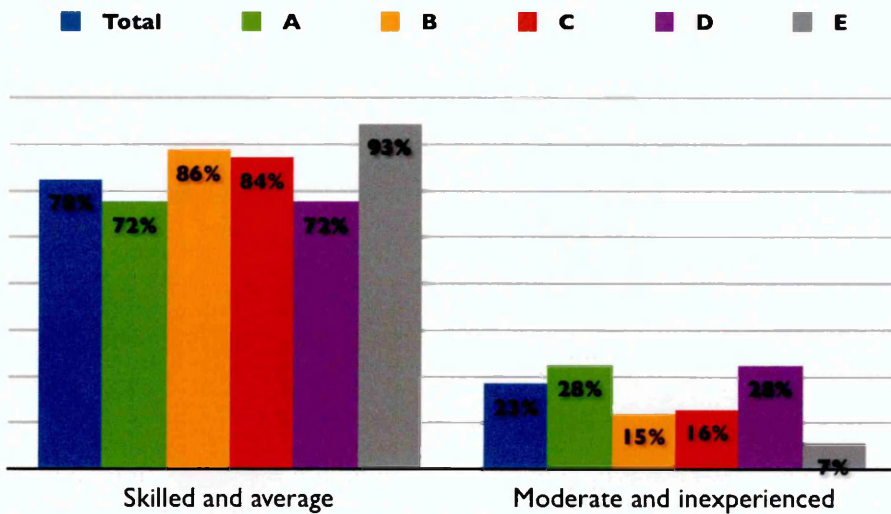


Table 6: Experience in the use of computers per faculty

The results showed no significant difference by age, although teachers aged 51 years and older were slightly more inexperienced. The number of years that teachers were employed seemed to have no influence on the use of computers. Younger teachers (<30 years) stated they were slightly more experienced but significant differences with older teachers were not found.

### 5.2.1. Specific use of computer programs

The skills and experience in the use of specific computers programs was researched by asking respondents to tick on a four-point scale whether they were very experienced, experienced, moderately experienced or inexperienced. The list of programs or applications was divided into programs on the Internet that were used a lot by students at that time, e-learning applications that were used at the university, and two specific programs for digital assessments that were used in this university.

#### Internet

82% of the respondents said they were experienced or very experienced in the use of the Internet. The rest (18%) stated they had a moderate experience or were inexperienced.

#### Microsoft Messenger

According to Microsoft in 2006, 90% of the young people under the age of 20

used Microsoft Messenger. From respondents in the age of <20 -35 the use of Microsoft Messenger in this university was 50%. The average use of this program by teachers in this university was 27%. The table below shows that young teachers made more use of Messenger and that the majority of teachers were inexperienced.

■ Total ■ > 30 years ■ 31- 40 years ■ 41-50 years ■ > 51 years

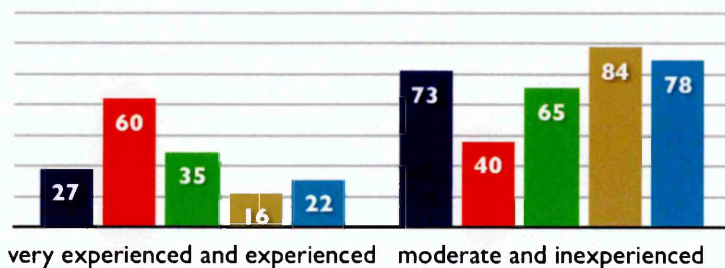


Table 7: Percentage of teachers with experience with Microsoft Messenger

### E-learning environments

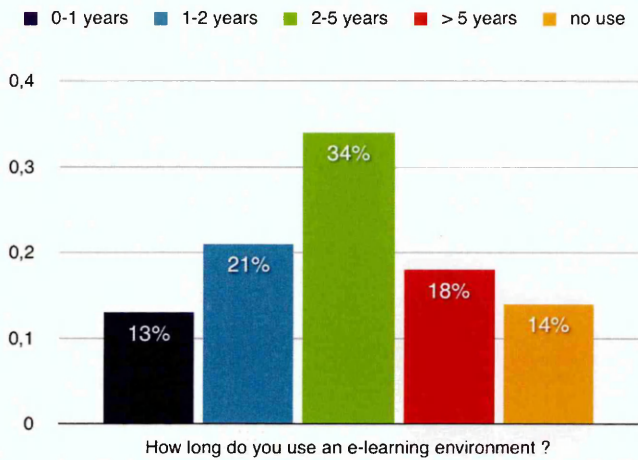
Of all the teachers in the university, 14% did not use an e-learning environment. With 23 %, the non-use at faculty A was significantly higher. The majority of teachers had used e-learning programs for between 2 and 5 years. Most experienced were the teachers from faculty D (48%). From all teachers that stated that they did not use an e-learning environment, 42% claimed this was because it was ‘useless’ or ‘not necessary’. Or as one of the teachers answered:

*“I don’t see the usefulness at the moment. For presentations I make use of PowerPoint and sometimes I direct students to websites with tests”.*

Another teacher stated:

*“In the past I used Blackboard for 3 years, but I thought it was time consuming and it added nothing to my subjects”.*

More than 25% of the non-users stated that they did not have the necessary knowledge and skills to use an e-learning environment.



**Table 8: Teacher's use of e-learning environments**

From all the teachers that used an e-learning environment, more than 40% argued that they did this because of the ease to spread learning material, because of the flexibility, accessibility and fast communication. One of the respondents answered:

*“It is easy because I can contact my students from home and because I can upload learning material that they need for projects. No more copies. Ideal”.*

Almost 34% of the teachers mentioned the ease to communicate with students.

*“It is an important tool to have fast communication with your students about the content of lessons. The sheets I used are now in Blackboard, and the students can use these to understand the lessons”.*

About 10% of the teachers stated that they used an e-learning environment because it was already used in the modules in which they taught.

At the moment of this baseline survey the e-learning environment Blackboard was most used at the university. 59% of the teachers claimed to be experienced users of Blackboard. In faculty C this was 76%. The number of inexperienced teachers was the highest in faculty A (18%). Three more programs were used in the university at that time. At faculty B they used the

program BSCW. In faculty E the program Virtual Action Learning was used much (30%). This program was also used in faculty B (12%) and faculty D (23%). In faculty E a special e-learning environment was developed which was used by 70% of the teachers of this faculty.

A new Student Information System was introduced during the time of the survey. The results show that it was only used in two faculties and the average use was 15%.

### Digital Portfolio and Digital Assessments

The survey showed that at that time 67% of the teachers of Otto University were inexperienced in the use of Digital Portfolios. 12% of the teachers had some experience. In this university two programs were used for digital assessments - Teleform and Question Mark Perception (QMP). Only 20% of the teachers used digital assessments. QMP was used by 14% and Teleform by 9%. Assessors used digital assessments to the same extent as all their other colleagues.

### Digital experience of teachers in faculties

Faculty E at that time consisted of the institute of Information and Information Academy. As expected and because of the nature of this faculty, the number of teachers that used digital applications was the highest at this faculty. The teachers in this small faculty said they had the most experience with all the applications that were listed. Teachers in Faculty A were the least experienced.

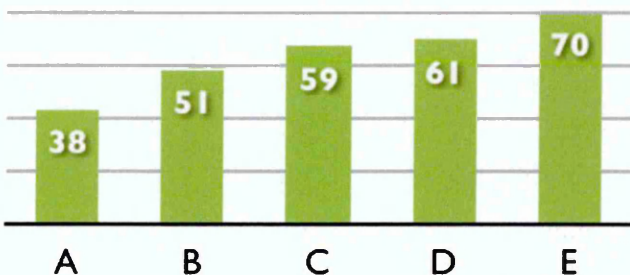


Table 9: Percentage of teachers per faculty that said they were digitally experienced

## ICT Training needs

From all respondents at the university, 52% had attended some form of training in the last year to learn how to use a certain ICT application. Of that number, 33% were trained by one of the ICT coaches, 33% had different forms of ICT training, and 28% were trained by an application manager. The majority of teachers (54%) stated they were self-taught in the use of ICT applications.

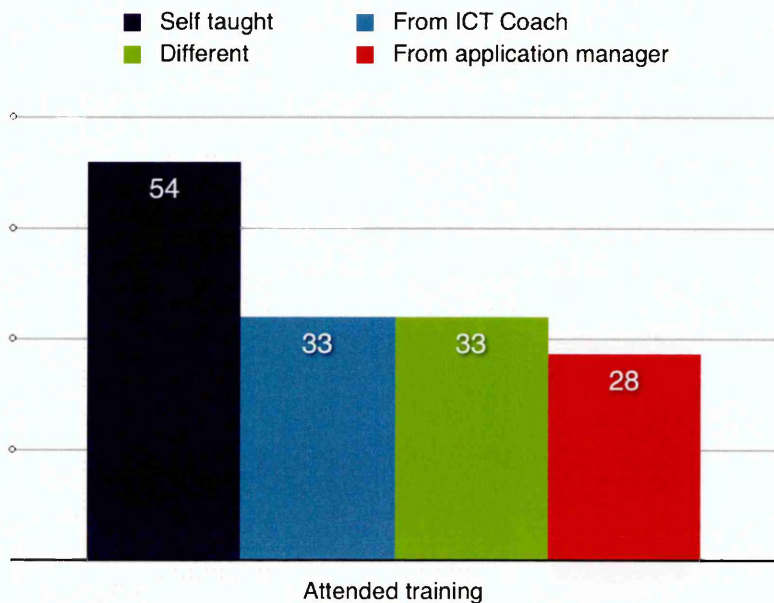


Table 10: Percentage of teachers that attended an ICT training course

The question “What would you like to learn with regard to ICT and education” resulted in a great variety of answers. This variety of answers was classified in eight categories:

1. E-learning -environment/ Blackboard, SIS (Student Information System)
2. ICT and pedagogy
3. ICT and education in general
4. Digital assessments / Digital portfolio
5. Generic interest
6. Multimedia applications
7. Social Media /communication
8. Don't know/ No interest



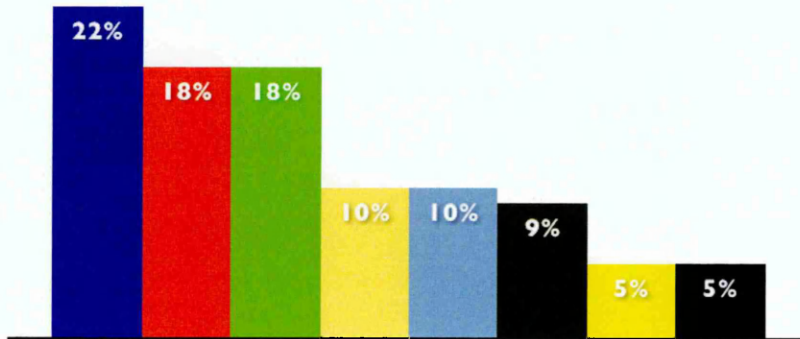


Table 11: Teacher's interest in subjects for training

From all respondents, 77.5 % said they had an interest to learn something in the field of ICT. Almost 60% of the respondents could describe what they wanted to learn. A minority (22.5%) said they had generic interest or named specific programs in their profession. Approximately 20% of the teachers did not indicate an interest. A small number of teachers had interest in the pedagogical use of ICT in education. Answers in this category included *'to know what works for students and what does not'*; *'research the pedagogical possibilities'* or *'I want to discover the pedagogical possibilities of ICT because E-learning is still in its infancy'*. The possibilities of the new e-learning environment, Blackboard and the Student Information System were mentioned by 18.5 % of the teachers. A need for instruction and skills in the use of multimedia programs such as Photoshop, PowerPoint and video editing programs was ticked by 9.2% of the teachers. A small number of teachers (5.3%) asked for more knowledge in Social Media and Communication software.

### 5.3. Knowledge sharing

One of the objectives of the baseline survey was to explore whether and how knowledge was shared with regard to ICT and learning, either face-to-face or

virtual. In the survey 14% of the teachers stated that they were involved in some sort of network in the domain of ICT and education. This was significantly higher in faculty E (24%) and in faculty B (21%). To get knowledge about ICT and learning most teachers consulted their colleagues in the same department (74%) or surfed the Internet (52%). Knowledge was gained virtually on the university's Intranet by 38% and the knowledge website about ICT was visited by 18% of the teachers.

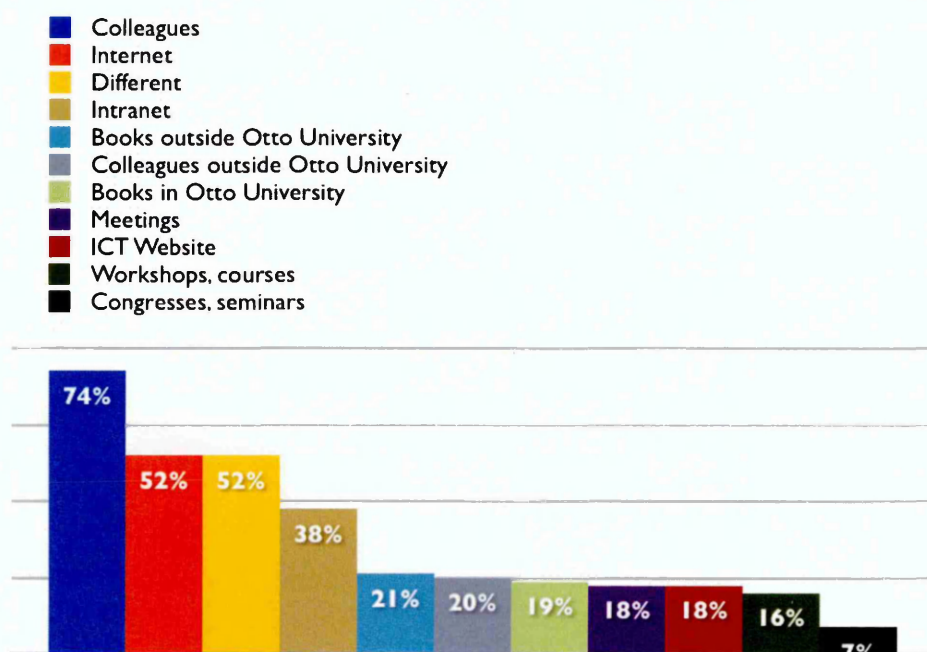


Table 12: Teacher's consulting for knowledge and information about ICT and learning

The virtual knowledge network about ICT and learning was seldom or never visited by more than half of all teachers. Only 3% stated that they visited this website always to get knowledge about ICT and learning and 15% said they did that regularly. A quarter of all teachers never or only seldom used the university intranet. Teachers had the possibility to contribute to the knowledge website of the university. Only 4% said they had posted something. Most teachers stated that they had no subjects to post or publish; 'time' was another hindering factor to publish something on the website.

Teachers showed a positive attitude towards sharing knowledge and learning material with colleagues. More than half of the number of teachers did not

have any objections to others using the lessons that they developed. A third of the teachers agreed with the use by others, but only if the source was referenced. A minority of 10% of the teachers wanted to be asked first about the use of their material.

#### **5.4. Attitudes to the use of ICT in education**

The use of ICT in education by teachers depends on the extent to which teachers judged the usefulness and functionality of ICT. In the Netherlands, every five years the use of ICT in higher education is monitored in a survey (Vier in Balans Monitor 2009 -in Dutch). One of the questions in the survey monitors the usefulness of 12 different functionalities for the use of ICT in education. To shorten this baseline survey, this question was reduced to five functionalities;

- The use of ICT for a course or module in an e-learning environment
- The usefulness of a digital portfolio
- The usefulness of a digital assessment program
- The usefulness of digital information about rosters and availability of teachers
- The usefulness of online communication about the learning process.

In general the teachers in this university were positive about the use of ICT. Most mentioned was the possibility to communicate with colleagues in order to get information about whether teachers were available, the communication of the learning process and the use of an e-learning environment for a course or module. Least mentioned was the usefulness of a digital portfolio. 12% of the teachers stated that this was 'not useful' and 10% did not know whether the use of a digital portfolio was useful.

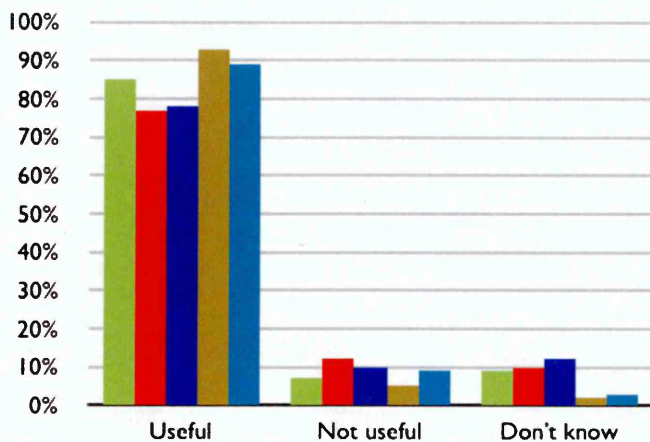


Table 13: Teacher's motivation to use ICT or ICT applications for learning

## 5.5.Maturity Levels

To explore the role of ICT in the daily teaching practice of the teachers, questions were asked about the way teachers perceived their use of ICT. In order to determine their maturity level, teachers were asked to choose between three ways of ICT use in their teaching practice (see appendix 6). For 42% of the teachers, ICT had not changed the structure of the curriculum. They used ICT to replace formerly used learning objects or learning methods (CD-Rom instead of a book; e-mail instead of printed notes and PowerPoint presentations instead of a reader). According to the classification of the maturity levels of Itzkan (1994) these teachers were in the Substitution Stage.

More than half of the teachers (51%) were in the Transition Stage. These teachers acknowledged that ICT had partly changed the structure of their teaching and that students would notice this in the performance and organisation of education. The last maturity level is the Transformation Stage. 7% of the teachers in Otto University stated that ICT had changed the structure of the education in such a way, that it can hardly be compared with the former way of teaching (for example a far-reaching flexible form or the design of demand-oriented education).

■ Substitution ■ Transition ■ Transformation

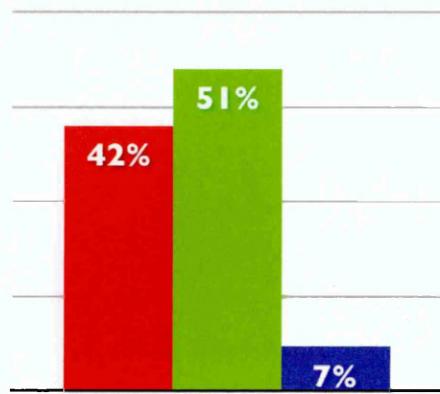


Table 14: The use of ICT in the teaching practice of the teachers

Two pairs of theses were presented to check the consistency of answering the question about these three different ways of ICT use. Teachers were asked to state which of the theses fitted best to their own practice.

#### Thesis A

1. ICT replaces a number of learning objects. If ICT would no longer be available, this would not be a big problem for the structure of my education.
2. ICT is an integrated part of my education. If ICT would no longer be available, I would have to restructure (a part of) my education.

#### Thesis B

1. ICT has changed the content, pedagogy and organisation of my education in such a way that, if ICT would no longer be available, my teaching would have to be redesigned completely.
2. Without ICT the organisation or design of my teaching partly would have to be changed

Thesis A confirmed that a small majority of the teachers were in the Transition Stage. The first question about the use of ICT in the teaching practice showed that 7% of the teachers were in the Transformation Stage. To

check the consistency Thesis B was asked. The outcome confirmed that a minority (14%) of the teachers perceived that without ICT they would have to redesign their teaching practice.

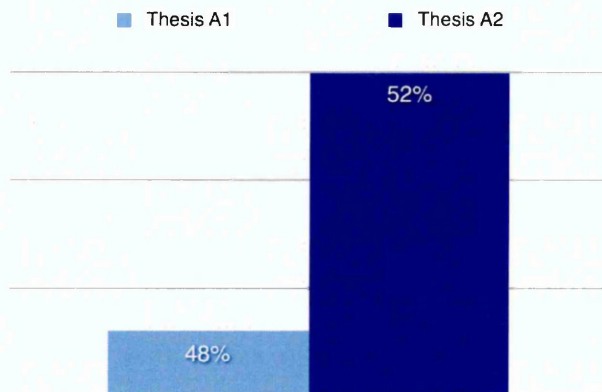


Table 15: Results of Thesis A

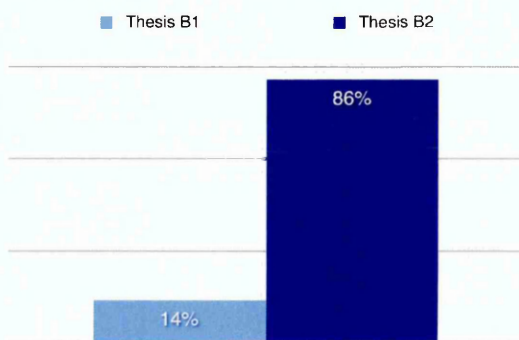


Table 16: Results of Thesis B

In all questions that were related to the maturity levels, the results of the teachers of faculty A were significantly different. In faculty A more teachers were in the substitution stage (50%). The percentage of teachers in faculty A that chose answer 1 in thesis A was 68%; the average of the university was 48%. In the second thesis the deviation is less significant. However, 95% of the teachers in faculty A choose answer 2 against 86% average of all teachers.

## 5.6. Strengths and Weaknesses in the development of ICT

Teachers were asked whether they could mention strong or weak points in their institute or faculty with regard to the use of ICT in learning. Almost 40% of the teachers could not give an answer to that; 3.7% wrote a negative remark; 28% of the teachers could not think of a weak point.

All answers to this question were classified into seven issues:

- 1. Knowledge and education
- 2. Management Support
- 3. Software and applications
- 4. Infrastructure
- 5. Motivational environment
- 6. Communication about ICT
- 7. Time

### ***1. Knowledge and education***

9% of the teachers stated that the knowledge and education of teachers and the fear to use ICT was a weak point. In faculty E, 17% of the teachers thought that there was little or no knowledge about ICT and learning. As one of the teachers noted:

*A vision or strategy on knowledge management is missing. The approach of knowledge management is mainly focussed on documenting or filing knowledge, but there is too little focus on knowledge creation and knowledge sharing. (Teacher faculty E)*

### ***2. Management support***

Almost 10% of the teachers were satisfied with the focus of Faculty Management on ICT and the support they got to implement ICT and learning in their teaching. Also the possibilities to get training in this field were mentioned as a strong point. This was the strongest at faculty A where more than 14% of the teachers were satisfied with the support. However the extent to which the teachers of this faculty used ICT in their teaching practice was the lowest, and 54% of the teachers in this faculty could not answer this question. In faculty D 15% of the teachers judged Faculty Management support as weak.

*There is too little organisational support and management does not take into account that we should be rostered in classrooms that have the right hardware. There is too little decision power and they don't take into account the preconditions that we need".*  
(Teacher faculty D)

About 13% of the respondent teachers judged the support of their Faculty management as a weak point.

### **3. Software and applications**

Software and applications were stated as a strong point by 15% of the teachers in the use of ICT and learning. Examples were given like 'The use of CAD/CAM software' or 'the applications of Virtual Action Learning'. The appreciation of the diversity of software applications was the highest in faculty D (21,4%). However software was seen as a weak point by 20% of the teachers of faculty C. From all the teachers in the university, 8% were not satisfied about software that was used in the university.

### **4. Infrastructure**

Satisfaction about the ICT infrastructure was mentioned by 7% of the teachers. Quotes like '*good help-desk*', '*very good support by administrators*', and '*they do their utmost to help you with your problems*'. However this was mentioned as a weak point by 10% of the teachers.

*'It takes months and a lot of frustration' before an application is running on students' and teachers' computers'. (Teacher faculty A)*

### **5. Motivational environment, strong focus on the development of ICT in the faculty.**

Of all the strong points, this was mentioned the most by teachers of the university. Almost 20% of the respondents noted statements like 'all teachers are open for it' or 'the willingness of colleagues to help me'. Others stated that there was a pro-active mind about ICT in the institute and that there was a lot of enthusiasm by teachers and management to innovate. At faculty E, 41% of the respondents judged their colleagues as a weak link in the



development of ICT and learning. *'There are still too many colleagues that swear to use an overhead projector and the handwritten note'*.

## **6. Communication about ICT**

Communication about ICT in general and about software and hardware was seen as a weak point by 8% of the teachers. These respondents did not know where to find the right information because they perceived that too much was published in the university. Others worried about the growing dependency on ICT.

*This university is so big that no one has the right overview of what is actually happening. We have a bombardment of e-mails, information, and invitations and sites where to find information, what you should use. If you want to keep up it costs too much time to find your way in the digital world. (Teacher faculty A)*

## **7. Time**

Lack of time is said to be a hindering factor by more than 10% of the teachers. At faculty A and E this was stated by 17% of the teachers.

*We as teachers are so busy here, that we get no time to learn how to work with ICT. We cannot keep up with the speed of development if we are not facilitated in time for this. I am convinced that if management would give this priority, we could work with ICT in a fantastic way. (teacher anonymous)*

### **5.7. Digital coaches**

The coaches responded to the same questionnaire items. In addition they were asked to answer 6 more questions about their motivation and expectations of the network (appendix 7). By the time the baseline survey was held 22 coaches were active. They were surveyed a month before the survey among the teachers was held. 16 coaches completed the online survey. Two coaches responded that they were no longer active as coaches and completed the questionnaire as teachers. At the moment of the survey, no coaches were active yet in faculty A and E.

The results showed that the majority of the coaches (64%) felt themselves to be experienced users of computers. The rest of the coaches (36%) judged themselves to be average users of computers. All ICT coaches used an e-learning environment, most of them for longer than 5 years.

As expected the ICT coaches scored higher when they were asked about their experience in the use of computer programs. This was significantly higher in the use of Blackboard, the new e-learning environment and the Digital Portfolio. 57% of the coaches hardly had any experience with the new Student Information System and 14% did not have experience with the new e-learning environment.

Courses about ICT application and about ICT and learning were attended by 86% of the ICT coaches.

### **Knowledge Sharing**

Knowledge sharing was one of the important objectives of the ICT coach network. More than 64% of the ICT coaches were members of one of the knowledge networks in the university. Almost a third were involved in the implementation of one of more ICT applications at the university. ICT coaches were significantly more adjusted to the use of virtual networks than the teachers in the university. The digital knowledge networks were visited regularly by 42% of the coaches, while 50% stated that they visited the networks 'now and then'. Half of the coaches published more than once on the university's virtual knowledge network. The coaches who did not publish stated that they had no time for that; unlike teachers who said they did not have a good subject to publish as the main reason for that.

The ICT coach virtual network that was specially established for the ICT coaches was seldom or never visited by 36% of the coaches and the same percentage of coaches visited the site now and then. The Internet was stated to be the most important source for coaches for knowledge about ICT and education.

## **Maturity Levels**

The coaches were asked the same questions as in section 5.4. The results showed that 51% of the coaches were in the Transition stage. Only 7% of the ICT coaches were in the Substitution Stage. This was validated by the answers on both theses. The answer on thesis A (“ICT is an integrated part of my education. If ICT would no longer be available, I would have to restructure (a part of) my teaching”) was answered positively by 86% of the ICT coaches. In thesis B (“ICT has changed the content, pedagogy and organisation of my education in such a way that, if ICT would no longer be available, my education has to be redesigned completely”) 21% of the coaches answered positively.

### **5.7.1 Expectations of the ICT coaches**

The ICT coaches were sceptical about the motivation and interest of the teachers in the university to work with an e-learning environment. The thesis “*Teachers are motivated to use an e-learning environment*” was disagreed with by 36% of the coaches and 57% answered “Don’t know”. Less uncertain were the coaches to answer the thesis “*There is enough interest by teachers to attend the internal training*”. 21% disagreed and 57% were neutral about this.

The thesis “*ICT is sufficiently used in my faculty*” was disagreed by 35% of the coaches and 57% were neutral. Most coaches (71%) agreed with the thesis: “*most teachers in the university use ICT too little in their teaching practice*”. The rest of the respondents were neutral and no one disagreed.

The motivation to join the ICT coach network was mainly based on the attitude to help colleagues and to stay informed about educational innovation. All coaches stated this as important or very important. Knowledge sharing was another strong motivation to join the network. Most coaches stated that supporting and instructing colleagues was their most important assignment in the network. A minority of the coaches was sceptical: “*I don’t have the feeling that I participate in the network. The meetings that I had were only attended by a handful of colleagues*”.

The coaches were critical about the significance of the network for the university. *"Most things are pre-chewed and offered top-down"*, or *"Budget, time and different knowledge levels are bottlenecks"*. Another coach wrote: *"I have no expectations. I have the feeling that coaches are used in faculties in different ways and that we do different things"*.

The coaches hoped they could have profit of the knowledge sharing and experience in the network to learn about the new applications (See 7).

## **5.8. Closing remarks**

The four preliminary interviews and the results of the baseline survey gave insight in the use of ICT in the teaching practice and a general insight into the knowledge, attitudes and behaviour of teachers about the use of ICT. Based on these preliminary interviews and the results of the survey an interview schedule was made (see appendix 1) to interview all the ICT coaches. The findings of these interviews are reported in the next chapter.

# CHAPTER 6

## Results of Qualitative Methods

### 6.1. Introduction

This chapter reports the findings of the qualitative methods used in this case study. Three groups of stakeholders in this research were identified. First there was the Network Managing Group (NMG). This group consisted of five staff members of the Educational Service Centre of the university that started and managed the ICT coach network. The second group was formed by the ICT coaches, divided over four faculties, faculty A (Business Administration), B (education), C (engineering) and D (Development and Society) (*it is to be noted that faculty C and E, as mentioned in section 5.1., merged to one faculty. In the next chapters of this thesis, these two faculties are reported as faculty C*). Codes are used in the text to anonymise the names of the coaches, faculties and Network Managing Group. The third group were the Senior Managers. This is a collective group name for the Executive Board, who were responsible for the policy direction of the university, and the Faculty Management of each Faculty who were responsible for the appointment and support of the ICT coaches (see also Figure 1). No members of this group participated in the research but participants in the first two groups were questioned about the support and policy of these Senior Managers.

The findings of the research will be presented in the chronological order in which the methods were used. First the personal interviews with the ICT coaches are reported. Secondly a narrative report is given of seven network meetings that were attended during the study. The third part reports the focus group interviews with ICT coaches by faculty. The last section will report the interviews with the Network Managing Group.

### 6.2. Interviews with ICT coaches.

#### 6.2.1. The appointment of the coaches (how and why)

According to the profile of the ICT coach which was developed by the Network Managing Group (NMG), the job of ICT coach was supposed to be undertaken

by persons with certain 'know-how' in the use of ICT and with experience as a teacher. The majority of the coaches were asked because they had experience with Blackboard, the MS Office suite or because of their general interest in computers. Of all coaches, a third were ICT teachers. Most ICT coaches were asked by their Senior Manager or by the NMG. The results showed that ICT coaches who had a job as ICT teacher in their faculty were asked first. Those ICT teachers stated that this was the main reason. In faculty A, four of the six ICT coaches were also ICT teachers.

*...well I was asked by my colleague, he is an ICT teacher, we are with six ICT coaches in this faculty and four of them are also ICT teachers.....so there is a high ICT component among us and this is talked through from one to another. (Coach A5)*

The other two ICT coaches in this faculty were asked because of their interest in new media or their affinity with the Internet and because they were already involved in ICT projects.

*....four years ago I started a notebook project, this was started because there were too few PCs in the faculty. A project team was started to motivate students to buy a notebook and to promote that we introduced Blackboard Wireless.....and I was involved from the start in this project and they knew I was interested in innovation in ICT. And this was the reason I was asked to be ICT coach. (Coach A1)*

In faculty B all coaches were ICT teachers. They were already working as ICT coaches in their faculty before the network was started. The NMG stated that for this reason the ICT teachers of this faculty had to be asked first.

*..we have invented the term. It was a continuation from what we were doing already. We had our ICT projects every year, with a project organization and an ICT coordinator, which was myself, and my colleagues were the project team members. And within this project we supported our colleagues so this was more or less*

*formalized in the ICT coach network. The [teaching] hours for the project team were diminished. (Coach B3)*

Not all ICT coaches were teachers. In faculty D two coaches had other jobs. In this faculty an application manager and an administrator were appointed for the job. In faculty C and D some coaches were appointed because they needed some timetable hours to be filled.

*We have always said that it must be a teacher, an educationalist, someone with experience....but at the end it is the management of the institute who determines and appoints a coach, and they often think 'well, he has some hours left ', well and then they don't look at the profile. (NMG 1)*

### **6.2.2. The assignment of the coaches**

The respondents had different views on their assignment as ICT coach. Most coaches said they did not know the document in which the profile of the ICT coach was described by the NMG. If they had seen it, they could not remember the content of the document. A question in the interviews was: *"Did you get an assignment or target as an individual coach or as a group?"* All coaches answered negatively. Not one ICT coach was given a concrete measurable target or objective. A precise assignment, in their perception, was not given. A few knew the profile made by the NMG but most of the respondents gave very general answers to this question. These answers varied from 'giving support and training to teachers' to 'helping colleagues in the use of computers'.

*...an assignment was not discussed with the NMG. I am now active as ICT coach in the Student Information System and I have worked together with the people that made this program. And after that I found my own way and I was satisfied with that.....".(Coach D4)*

The majority of the ICT coaches related their assignment to the implementation of the new applications, training the teachers in the use of these applications and giving them experience of working with these

programs. Faculty D chose to specialize each of the ICT coaches in one of the four new applications and let them choose one other application as a secondary speciality.

Some ICT coaches struggled with their role as ICT coach. They felt that they were not ICT coaches but acted more as application managers, a coordinator of the transition or in some cases just '*the help desk*'. In the perception of some the ICT coaches the difference between an ICT coach and an application manager was not quite clear, either for the ICT coaches or for the teachers in the institute.

*....it is difficult for me to say what the border is between an application manager and an ICT coach. According to me an ICT coach is just a person who trains colleagues, and maybe sometimes also students in the educational use of ICT applications. But I also have to write ICT policy plans and think of new ways of working. But according to me this is the primary task of an ICT coach”.*

(Coach B7)

The ICT coaches were mainly occupied with the implementation of the Student Information System and the new E-learning environment. The main objective was to make the teachers familiar with the use of these applications as soon as possible. Nevertheless, more than half of the ICT coaches stated that they were pedagogically oriented.

*My objective is, because I am transition coordinator, first to enhance the pedagogical and educational use of ICT by my fellow coaches by letting them go to workshops and congresses, and let them experience what you can do with it pedagogically.....the ICT coaches all have some ICT background. In that respect I think that I have the least, but what you see in our institute is that the pedagogical education of teachers is not their strongest side. That is not a criticism but only reality. Everybody comes here from his or her own professional*



*background, follows a course in pedagogy but is soon running along with the mass. (Coach A4)*

One of the ICT coaches stated that pedagogy was not a task of the ICT coaches but a task that belonged to the teachers and that their task was mainly to persuade the teachers to work in this way. According to a great number of the ICT coaches, their task was mainly to teach the use of the applications. For example, in faculty A one of the ICT coaches explicitly stated that the job of an ICT coach was not pedagogical at all and that, according to him and his colleagues, the 'training of the buttons' had priority.

In general the coaches saw their assignment in particular as teaching their colleagues better skills with computers. Some of them mentioned training for a 'digital driver's license' and supporting them in personal computer use. They mentioned '*giving a helping hand*', '*brush up*' colleagues or, '*show them generally what you can do with it*'. In faculty C one coach got a specific assignment from his institute to get the applications introduced. In faculty D two coaches said similar things.

The way in which the training was given by coaches differed by faculty or institute. In faculty B the ICT coaches were free to do things in their own way. In two institutes of faculty D the ICT coaches were also available to help the students with the new applications. Training was given one-to-one by a considerable number of ICT coaches but training was also given in the classroom. The time that ICT coaches were able to spend on the training of the teachers differed significantly by faculty. In some institutes, 40 hours were available for coaches, in other institutes 100, 160 or 200 hours. The faculties did not use an hourly schedule, or certain calculation methods to determine the availability of ICT coaches. Because most ICT coaches also worked as teachers, the number of training hours was geared to their teaching. This was done to avoid conflicts in their time schedule because teaching hours interfered with ICT coach activities.

### 6.2.3. Coaches' knowledge about ICT and learning

Interviews with the coaches showed that the majority of them were self-taught in their knowledge about computers. Only two ICT coaches were educated in the use of ICT. However in one case this was technical education as a network specialist. Three older coaches had followed an ICT application course more than twenty years ago. A third of the ICT coaches worked as ICT teachers; they had developed their skills by home study, hobby or workshops and training.

*I always have had interest in computers and PCs, not developed that by courses or education. In my profession I work mainly with women, and they have less interest in computers and ICT applications. For years I have worked in a team where I was the only man and I did all the things about ICT. In my team I was more or less the help desk and that is how it grows.....(Coach D10)*

*My knowledge comes mainly by visiting conferences and attending presentations within the university. I read some magazines and papers about ICT and from that I try to find practical things that I can use. (Coach D1)*

*Well I exchange some things with colleagues and I use articles from journals. Most of the time I only browse for things if I need something for an occasion. I don't have time to spend much time on that. My regular work makes that impossible. (Coach B3)*

*I use the Internet, some specific websites that are made for ICT and education. (Coach B4)*

### 6.2.4. Coaches' perceptions of the motivation of teachers

In the interviews coaches were asked about the interest that teachers in the university had in working with ICT and in participating in the training. The insight that that coaches had into the development of ICT in other faculties and the university in general was also explored.

In faculty A, training was made compulsory by Faculty Management. However there were no sanctions if teachers did not show up. The ICT coaches of faculty A personally invited all teachers and most teachers accepted this invitation. There was a small percentage of the teachers who were not willing to participate in the new developments.

At the time the interviews were held, the training of faculty B had not started. Although training was compulsory for all the teachers, the teachers were '*not itching*' to participate in the training. It was said by one of the coaches that it takes a long time before changes are sustained and that it will take years before certain models are accepted.

Coaches perceived that teachers were afraid to be confronted with new applications. All possibilities of e-learning environments were hardly used and Blackboard was only used by a small group of teachers. Time pressure was frequently said to be the most hindering factor for the use of an e-learning environment.

*.....yes they have to use the new Student Information System but there was resistance. The fact is that it is another new application".(Coach B8)*

*.....they feel being pushed but they have to. Teachers are not keen to use the system but they must.(Coach B1)*

*.....those that use e-learning hardly use all the possibilities this application has. It has become a space for information and a one-way-traffic for the teacher who dumps some documents into the system and leaves the rest to the students.(Coach B3)*

According to the six ICT coaches in faculty C, the interest among teachers to start with the new e-learning environment varied considerably. They even experienced resistance among a great number of teachers. The coaches said that mainly older teachers resisted and it was suggested by them that the frequent change of applications was the main reason for that.

The ICT coaches in this faculty thought that a quarter of all the teachers in their faculty were not interested in new applications, while the majority of teachers had a neutral attitude.

*.....it is what teachers think. They are not interested in e-learning yet. Some of them have a strong resistance. They want to stick with traditional classroom learning because they have done so for many years.(Coach C2)*

In the perception of the ICT coaches of faculty D, there was enough willingness of teachers to participate in training. However the organization of the training was difficult due to the time pressure that teachers felt in their schedules.

The necessity to learn new applications all the time was said to be one of the causes for lack of interest and the non-participation in training. Teachers' attitudes varied a lot in that respect. On the one hand there was interest to be involved in the new developments; on the other hand it was also experienced as being too much pressure. The ICT coaches in faculty D stated that there was much pressure on the teachers to be involved in all the new developments and for that reason the implementation of the new ICT applications was perceived as irritating for the teachers. The shift from Blackboard to the new e-learning environment was, in the perception of the ICT coaches, too fast and caused much resistance from the teachers. All ICT coaches declared that the motivation varied considerably.

ICT coaches believed that the teachers were curious enough to think about new things and to cooperate in the development of education. However they stated that teachers should get more time to learn the new applications. Short demonstrations were organized in faculty D to show the teachers the new applications; but due to poor communication towards the teachers these demonstrations were attended by only a quarter of the teachers. Approximately a third of the teachers did not attend the training at all. An institute in faculty D had experience with Virtual Action Learning (VAL) and Blackboard. The perception of the motivation of the teachers to change from

Blackboard to the new environment varied. According to most of the coaches the majority of the older teachers had more difficulty engaging in the new developments. In this faculty more than 35% of the teachers were older than 50. The ICT coaches thought that this group had much more difficulty to motivate themselves to participate in the training and in working with the new applications.

*Well I experience it rather differently. Let me put it this way. To the younger generation it is quite obvious and I believe more a challenge but the older generation has more difficulty with it. And then you also have a group of people, and I guess this is true for young and old, who, and that is more for the older colleagues, who, because they are so busy at the end of the year they are not in the mood to learn a new program. I think you need at least a year for the implementation. (Coach D2)*

#### **6.2.5. Coaches' attitudes towards participation in the network**

The NMG organised meetings between the ICT coaches and built a virtual network for the coaches to share knowledge and discuss training issues. The observation of these meetings is described in Section 6.3. and the actual use of the virtual network is described in Chapter 7. In this section the attitude of the coaches towards their participation in the network will be explored.

The coaches were asked about how and where they met each other. Whenever ICT coaches shared knowledge or had contact they had a strong preference to meet face-to-face instead of communicating in any digital way. The social aspect was very important to them. The majority of the coaches said that face-to-face communication was more accessible because any lack of clarity could be resolved immediately and the method was more interactive.

*I prefer face-to-face because you can discuss matters more in depth and you can better anticipate on the things that are done in the process. Virtual knowledge exchange is a much too static process. I may have a focussed question and to that I seek a*

*focussed answer.....these kind of discussions will not easily take place in a virtual environment. (Coach B4)*

*I think just face-to-face is the best way. It seems to be a nice thought to share things in a virtual place but the problem is that you have to read so much. We get so much e-mail a day and if you have to keep up with all those virtual places like intranet, our e-place and the e-learning environment, you name it, it is too much. In a meeting you can clarify all things at once. (Coach D4)*

Most of the coaches who attended the meetings said that face-to-face meetings offered a better way to explain problems and to convince colleagues if they had problems. On average between four and six meetings were organized by the NMG each year. Although the coaches preferred face-to-face meetings, the meetings were not attended intensively. Time pressure and roster problems were the most frequently mentioned reasons for coaches not to attend meetings. The impression that ICT coaches had was that the ambition of the university was too high and that this level of ambition did not fit with the possibilities and support that the ICT coaches got from their institutes.

At the start of the network the NMG built a virtual space on the web especially for the ICT coaches. In the beginning this was mainly done to announce meetings, store minutes of meetings and upload user manuals. Eight coaches clearly answered 'no' to the question whether they uploaded material to this web space. Only two confirmed that they did put documents on the website. In reality only one ICT coach was very active and two others placed documents. After one year, a weblog was made for the ICT coach network. The objective of this weblog was to inform the ICT coaches, offer them the possibility to react to information and questions and to enhance interpersonal consultation and support. The NMG positioned the weblog as a knowledge repository by storing documents chronologically and categorizing them in key themes. The coaches did not use the weblog. In the beginning some coaches tried it out, but others were not well informed about the existence of the weblog.

..... *in the beginning it happened that something important was posted and because of the enormous amounts of e-mails that I get every day, I noticed 'Oh a weblog, nice, I will have a look later', well I had missed something important then. Then I wrote to the NMG that it was not clever to hide something important in a weblog.....I think this is not the right tool to experiment with new ways of communication. I like the idea but I have not seen things on this weblog of which I thought 'oh nice'...."* (Coach B3)

Only two coaches liked the idea and experienced it as an interesting supplement. Coaches did not see this weblog as a tool to lower the threshold to the virtual web space. A great number of them said they did not know about the weblog. From all the ICT coaches that knew the web log, the majority stated that they seldom looked at it and did not see the advantage of it.

A year after the launch of the weblog a newly-designed website was launched as a virtual community space for the ICT coaches (see also chapter 7). Apart from a very small number of ICT coaches (*"handy to browse for material"*), the majority of the respondents did not see any added value in this new virtual environment. The different reasons for this all had to do with the usefulness of the material and the usability of the site. Terms were used like *'strange navigation'* and *'poorly organized'*. As a perceived objective for this website, respondents used terms like *'knowledge sharing'* and *'platform for ICT coaches'*, but they also said that little was happening on the site and that it was not a living community. Answers to the question about the number of times coaches visited this website' varied from *'never'* and *'rarely'* to an individual that stated *'once a month'*. The majority of the ICT coaches rarely visited the website. From the respondents who used the website, only one confirmed they had downloaded a document. The most mentioned reason for coaches not to visit the website was that they had no time, and that there were too many places where information was stored.

*The disadvantage of such a website is that you have to activate yourself to go there. That is different from mail because that is filtered for you. (Coach D10)*

*I seldom visit the site. In the beginning I had trouble logging in, but that is solved now. But yes, we from faculty A are only active from the beginning of this academic year. Before that other ICT coaches were active and all the activities of those exchanges are on the website. And if you are involved from the beginning you can find your way around. Now it is very badly organized for me. I miss a clear picture of the structure. (Coach A1)*

*No, I don't use it. This system, this website, I like the idea but I have more of those networks and everything is offered digitally. But I have no time to sit behind my computer and read for hours. I usually go straight forward on things". (Coach C3)*

#### **6.2.6. Coaches' attitudes towards the support of the ICT coach**

In this section the reactions of the coaches to the question 'What support do you get as an ICT coach?' is given. The answers to this question can be divided into three issues: support from Senior Management, support from the NMG, and facilitation for the job as ICT coach.

All coaches said that they worked on their own or with their colleagues in the faculty. The coaches made their own working plan and were self-steering. The majority of the coaches said they had had no contact with Faculty Management about the ICT coach network, the goals or objectives. Only two coaches (one from faculty B and one from faculty D) made positive statements about the support and involvement of Faculty Management. All other coaches answered in a negative way about the involvement of management. They all felt that they had to do it themselves.

*Management support is a strong word. We have to dance to someone else's tune for management. Management is not always informed about what is happening and what we are doing and what*



*is possible. Many times they say 'Oh well they can do it'. (Coach B2)*

*I think that is a shortcoming of management. Let me just focus on this faculty. There is no steering influence towards ICT and learning. It is delegated to the institutes. I feel rather alone here, you know, I feel too little pressure from my dean who could say 'how is ICT used here?' I don't get these sorts of questions and this worries me. (Coach C2)*

*I have discussed this; my dean has a rosy picture about the knowledge and motivation of teachers. We are talking in different worlds. (Coach D5)*

The majority of the coaches had a positive attitude towards the intentions of and the support from the NMG. However in faculty A and B the coaches worked on their own without guidance of the NMG. The coaches in these faculties judged themselves as more capable and better qualified than the NMG. They said that the NMG provided them with examples of training that were not applicable in their own institute.

*We no longer make use of the service of the NMG because we had no benefit from it. This is disappointing for those people because we are their clients and they get their income from us, but we have discussed this here 'What does it give us and what does it cost?' and we decided not to participate any longer. (Coach B6)*

Almost 15% of the coaches had a reserved opinion about the usefulness of the NMG. These coaches referred to the start of the ICT coach network and the first meeting that was organized for them. In this meeting they were told how to educate a group and how to set up a training course and they felt that they were being treated like beginners.

*It was a meeting in which we were shown and demonstrated how to use e-learning in education but it was more a pedagogical lecture. Well, if I do dislike something, it is pedagogy. I am not a softy, I am*

*a practitioner. I did not like that meeting at all and later I heard the same experience from others. In the beginning I thought 'I am mad, I cannot get what I want there' and others agreed with me. (Coach B2)*

More than fifty percent of the coaches referred to facilitating issues when asked about support. Facilitating issues included number of hours for the job, flexibility in roster, the speed of the ICT systems, and the presence of a help desk.

*Well I know that people are quitting this job because they no longer believe in it. That's a pity. For example <name coach>, he said 'I first want to know how many hours I get for this job, before I will do it', and <name coach> said 'Let them first organise it properly and facilitate the job'. (Coach D4)*

### **6.3. Field notes of the network meetings**

During the period of the fieldwork for this research field notes of seven meetings of the ICT coaches were made. In this section the purpose and the main objectives of those meetings and the subjects discussed by the ICT coaches are described. The meetings can be divided in two kinds, training meetings and evaluation meetings. The objective in the training meetings was to introduce coaches to the network and to train them in the use of applications and in e-learning in general. The objective of the evaluation meetings was to discuss best practices of certain applications and to share knowledge among coaches. The meetings were not recorded but field notes were made to enable the writing of a narrative impression of the discussion during the meetings and general impressions of the feedback from the coaches present.

#### **6.3.1. ICT coach Training Meetings.**

Three meetings were held in a period of a half-year from June 2005 to January 2006. The objective was to inform ICT coaches about the new ICT coach network and to train them to set up training for teachers. In the first meeting, in June 2005, the coaches were told what was expected from them and what support they could expect from the Network Managing Group. In this

meeting the coaches were informed about the name of the network, and dates for a few seminars were given. One of the members of the NMG presented the results of a survey among the ICT coaches about the desired functionalities of the new E-learning environment. Another member of the NMG presented the new virtual environment that was built for the ICT coaches.

In the second meeting, in December 2005, the ICT applications in which staff had to be trained were introduced and the organisation of training was discussed. Fifteen ICT coaches were present at this meeting. They discussed the facilitation of their job as ICT coach. Many coaches stated that the number of hours that they had to spend in this training could be a bottleneck because no hours would be left to train the teachers in the faculty. The majority of the coaches had doubts whether enough participants would attend the training. They all stated that they were concerned about the knowledge that those teachers had of certain educational ICT applications and the digital office applications in general.

During this meeting the NMG presented the concept of maturity levels (see also Subsection 2.3.3). This concept raised many questions. Coaches were not satisfied with the names of the levels and proposed to change the names into *Beginners* and *Experienced* Level. One coach asked whether coaches had the freedom to shape the training to their own needs. The coaches who were present agreed this and the majority thought that the maturity levels concept could be used as a guideline but that the ICT coaches themselves should determine how to use the training. In the meeting it was agreed that feedback to teachers in each faculty would be organized and that a new network meeting would be held to present how the coaches shaped the training in their faculty.

In the third meeting (January 2006), the coaches were taught how to train their colleagues in the use of the new e-learning environment. In this meeting the ICT coaches were introduced to a pre-formatted training session. The coaches had to formulate their learning objectives for this session and discuss these with their colleagues. The results of these discussions were presented

to the whole group. After that, one of the presenters demonstrated examples of the use of ICT in education. During the meeting the ICT coaches were asked to evaluate this way of working and how they could use examples in their own teaching practice.

The evaluation of the session showed that:

- The questionnaire at the beginning of this session raised many questions. The coaches did not know all the presented examples and they doubted whether teachers in general could work with these examples.
- The presented virtual environment for the coaches raised many questions and doubts about usability.

In general, the coaches judged the format of the training positively although many coaches also made critical remarks about the time pressure to implement the new applications in training. The coaches preferred a more practical way of working by learning on the job. They felt that the way in which this training was set up would take too much time.

In January 2007, a training session was organized to teach ICT coaches how to use a new digital assessment manager. Nine coaches were present during this meeting. In the first part of the meeting the coaches shared their experiences with the application. Some coaches had not worked with the application at all while others had just started. During the meeting a lot of questions were asked to members of the NMG about the use of ICT applications. The discussion showed that coaches had different opinions about the use of the e-learning application and the use of Digital Portfolios. Coach A1 remarked that too many applications had to be introduced in a short time. Coach A4 agreed but stated that this way of working was ordered by the Dean of the faculty and that he was afraid to discuss this with him. For coaches of faculty C, this was their first introduction to the new digital assessment manager. The last part of the session was used to practice with the digital assessment manager. Four coaches did not wait for this and left the meeting before it.

### 6.3.2. ICT coach Evaluation Meetings.

A session was held in March 2008 to evaluate the Student Information System. Four members of the NMG were present and six coaches. The coaches made negative remarks about the small number of coaches present and doubted the usefulness of attending the meeting because of the small number of colleagues. The coaches had their doubts about whether they were responsible for teaching their colleagues how to work with this new system. Some coaches stated that this was a responsibility of Senior Management.

During the meeting, coaches indicated that they were not satisfied with the new Student Information System. They stated that the teachers worked with the program only twice a year and that this would raise so many questions from teachers about the use of the program. Coaches were afraid their colleagues would ask them to do the actual work in the Student Information System. Because teachers used the program so little, the coaches were afraid that they would have to repeat the training every three months.

During the meeting there was much discussion about terminology, jargon, abbreviations and the procedures around assessments. One of the members of the NMG asked the coaches to participate in a usability test. However, the majority of the coaches present indicated that they were not satisfied with the usability of the system at all and suggested to improve the usability first. They were afraid that the outcome of this usability test would be very negative. Others asked whether it was really a usability test or a survey. One of the coaches said that they knew examples where teachers quit their job because of all this “*administrative fuss*”. In general all coaches present expressed negative feelings about the use and usability of this Student Information System.

In April 2008, a session was organized to discuss and evaluate digital assessment. Three members of the NMG were present, four teachers and three ICT coaches. In this meeting the NMG presented plans of the Executive Board to improve the quality of assessments and asked the coaches to evaluate the use of Question Mark Perception 3 (QMP), a program that was used in the university. They also introduced the release of QMP4. The ICT

coaches present said that they had not used QMP yet. The coaches asked what their role would be in the use of QMP. Were they supposed to make the assessments for the teachers in QMP because they know how to work with the program? The NMG could not answer that question. Coaches had a lot of questions about the organisation, administrative support and application management of digital assessments. They all had doubts about the use of QMP because they had the feeling that the teachers mainly assessed students in face-to-face meetings.

In September 2008 the new virtual environment for the ICT coaches was introduced (e-place). An evaluation meeting was organised in November 2008. The objective of the meeting was to evaluate ICT coaches' experience in general and the evaluation of the new e-place. Two members of the NMG were present and five ICT coaches. One of the moderators of the NMG stated that all ICT coaches had visited the e-place. A very small number of coaches were heavy users and the majority was lurking. The usability of the new e-place was discussed. Coaches still had no idea where they could find all the information. Many remarks were made about the quantity of information, which was perceived as too much. This led to some coaches using their own faculty Intranet while other coaches had built their own e-place. The coaches at the meeting argued that too much information about the ICT coach network was located in different places. Locations mentioned were the faculty Intranet, a virtual environment of the institute and even locations which had been made by coaches themselves. The official ICT coaches' e-place was also used for organisational matters such as registration for meetings and support for the use of the applications. This caused some irritation among the coaches present. A discussion was held about the organisation of Microsoft Sharepoint in the university. Coaches felt that there was no central policy and that the people involved in ICT in education created too many places. It made them feel lost in the many locations where information was stored. Remarks were made about the time pressure to capture all this information.

In the second part of the meeting, a discussion was held about the motivation of teachers. In general all ICT coaches who were present felt that teachers were motivated but that they lacked the necessary skills in ICT. The coaches' experience was that teachers felt a lot of time pressure and that they were not willing to spend much time in learning ICT applications. Especially the Student Information System was said to cause irritation to the teachers.

### **6.3.3. Changing the set up of meetings**

The meetings were evaluated by the NMG at the end of 2008 and the NMG decided to concentrate all their supporting activities in the first half of the year. The design of the meetings changed. Coaches could either attend single meetings or register for a series of thematic sessions. In their feedback to the NMG the coaches asked for more thematic meetings in which they could work on the theme over a longer period. The NMG wanted coaches to subscribe for those thematic sessions and confirm their attendance at all meetings. Those meetings were also available for non-ICT coaches. The following themes were offered: 1. Digital Assessments; 2. Training of Captivate, a program to capture screen movements; and 3. a theme about the role of the ICT coach (only for ICT coaches).

In addition to the training sessions and thematic meetings the coaches were offered individual consultancy and an annual personal coaching session. The NMG promised that all training material would be kept up to date and that the usability of the coaches' e-place would be improved. This case study ended before these activities were implemented and evaluated, so no results of that evaluation can be given here.

## **6.4. Focus Group Interviews with ICT coaches**

### **6.4.1. Introduction**

The main purpose of these focus group interviews was to get a deeper understanding of the knowledge, attitudes and behaviour of the ICT coaches in the process of knowledge sharing about their work as ICT coach. The interviews took place in the first months of 2009, one and a half years after the individual interviews which were held in 2007 with 31 ICT coaches. Four

focus group interviews were held and the sample of coaches was 22. Before the start of each interview the coaches were given a short questionnaire in which questions were asked about each of the following themes (see appendix 4).

1. The task of the ICT coach
2. Support for the ICT coach
3. The attitude of the ICT coach towards the use of ICT in education
4. The extent to which the ICT coaches shared their knowledge, either face-to-face or virtually.

The coaches were asked to fill in this questionnaire first and to keep the form with them during the interview. After the focus group interview the forms were collected.

The following sections will first present the results of the questionnaires and then present the main results of the discussion in the interviews.

#### **6.4.2. The ICT coaches' knowledge about their task as ICT coach**

The coaches were asked what they thought was their most important task and if there were other specific tasks for this job. On the questionnaires, almost 70% of the respondents stated that no specific result had to be achieved, or if it had, they were not aware of it. The majority of the coaches wrote *“supporting colleagues in the use of ICT applications”*. They also used terms like *“trouble shooting, training of skills to use applications”*. The results of the pre-questionnaire showed that approximately 70% of the coaches perceived their job mainly as supportive to the teachers. The majority referred to the technical use of ICT applications. Four coaches referred to a more pedagogical approach of the use of these applications.

*Coach C1: I give pedagogical support to teachers, that is knowledge of the software and knowledge of the pedagogical application of this software. Knowledge of the strategy to implement it and to change. Sharing knowledge with other coaches and advocating good practices. Training of staff in the pedagogical use of the software and developing training material and manuals. (Coach C1)*



*I think it is training colleagues in the use of ICT application in their daily practice as teachers and support them if they have problems, trouble shooting and advice. (Coach A5)*

In the questionnaire almost every coach said that they did not know the policy of their institute or faculty with regard to the use of ICT in education. The coaches also stated that no assignment or target was given to the coaches.

*The ICT teachers give the support. They are first responsible for the teams as far as the implementation of ICT in their teaching is concerned. (Coach B3)*

In the focus group interview the interviewer stated that in the profile that was written by the NMG at the start of the network some tasks were specified. The majority and the participants said they did not know about a written assignment or project plan. If they had seen it, they could not remember the content of the document. They determined their own goals. The coaches who answered that question used themes like *'taking away the fear for computers'*, *'supporting and helping colleagues'*, *'making applications work'* and *'making colleagues enthusiastic to use computers'*, *'implementation'* and *'introduction of ICT applications'*. Most coaches stated that their most important task was to support colleagues in the use of ICT applications.

A small narrative of the discussion in faculty C will illustrate this:

*Coach C5: I see my most important task to train the teachers in the use of the new e-learning application.*

*Coach C4: For me, I am mainly the consultant for my colleagues. It is very hard to separate this from my normal role in the organisation. As you said (pointing to his colleague) it is closely related to my work in the organisation. It is mainly about how you implement things. In this I take the lead, especially in systems, so I don't know if I am a typical ICT coach.*

*Coach C3: Well, but this is typical for the ICT coach*

*Coach C4: I feel that it is difficult to separate my role as ICT coach from my role as application manager, and from my role as student career advisor, because in all these roles I feel involved with aspects of all these roles. And I must say, it is my own fault, because I have a tendency to attract things to myself and I should not do that. I don't take the time to instruct people in such a way that they can take over the task. And that is what I need to do. Urgently.*

*Coach C3: Mainly supporting teachers to login into the applications.*

*Coach C4: Every aspect of that; really I do almost everything at the moment and that is too much.*

#### **6.4.3. The ICT coaches perceptions about the university's policy and management support**

The second theme on the questionnaire was: "What support do you need to do your job as ICT coach?" A wide range of answers was given. Those answers were classified into three categories: A. facilitation in time and software, B. commitment and support from Senior Management and colleagues, and C. training and support from helpdesk. Four coaches referred to category A. They mainly stated that they needed more time to do the job. Four other coaches wrote answers that could be categorised in B. These coaches identified the need for a strategic vision of Faculty Management. The majority, 14 coaches, referred to technical support and help from colleagues, and the help desk. Almost 23% stated that they did not see any role for the NMG. The rest of the coaches saw the role of the NMG mainly as facilitator during meetings.

During the discussion in the focus group interviews, all coaches confirmed that they had no knowledge of the policy of the university with regard to the ICT coach network. A project plan for the ICT coach network was written by the NMG but no guidelines were given about salary and working hours of the ICT coaches. All the coaches acknowledged that their managers had

formulated no targets about results. In one of the institutes, the coach made plans but this was mainly focused on supporting teachers and introducing them to new applications. In faculty B, a project plan was written about the use of ICT in general but not specifically for the work of the ICT coaches. In all the focus groups, the respondents said that ICT coaches were working as self-steering teams. In institutes with only one coach, the coach worked completely freely to make a project or policy plan. In faculties A and B, the coaches geared their work to one another, but in the other faculties and institutes the coaches worked individually. The coaches had no shared understanding or policy about their role in future.

*No, what I was trying to explain just now is that we miss this. We try to say to management 'We want a policy plan'. We want to make a plan, not just to organise how we should persuade our colleagues to come to the training but also 'How can we make ICT really support education pedagogically'. You cannot write such a plan in a short time..... and we are waiting for such a plan, so we say to management 'Support us make it possible for us to make it'. And they just say 'Well, make it and then we will let you know if we support it'. That is the situation in our institute. (Coach D12)*

Of the 22 coaches who participated in the focus group interviews, only three coaches referred to support from the management team. All other coaches stated that they needed technical support to learn how to use the diverse applications. In second place came the experience of colleagues and help of the NMG. In the annual job evaluation between Faculty Management and coaches, the work of the ICT coach was said not to be an issue. Coaches perceived that Faculty Management wanted to support them, but only if the coaches presented their own plans first. There was no initiative from the management to do so. The coaches said there was no policy plan on how to transform the use of ICT from just technical use to a more pedagogical use. The NMG published several 'expert papers' about the use of ICT in education but the coaches felt that the people who were responsible for curriculum development did too little with the advice that was given in these papers.

*.....I think that what they think is very typical. There is a middle layer in the organisation who invents all kinds of things and writes this in a paper and then they think that all people in the organisation will do this. But of course not. If you invent a job and you are not able to transform that in the whole organisation then it will not work. This is the other way around. You can invent this but in the lower layer of the organisation there are people who have to organise themselves and they are very busy with their teaching job. (Coach C3)*

The ICT coaches believed that policy was the responsibility of the NMG but the support and attention from the NMG as fragmented. The general feeling of the coaches was that the NMG had played a role when the new applications were enrolled, but now that everybody was working with the new applications their role had decreased.

*....the NMG should facilitate the network, isn't that it? (Coach C4)*

*Well, in my opinion the NMG is on a siding.(Coach C3)*

*Yes, you are right, they are operating more on the pedagogical side and we have no time for that. (Coach C5)*

In general the coaches missed support of Faculty Management. A few coaches wanted to quit for that reason; others made their own plans and liked to work individually.

#### **6.4.4. The attitude of the ICT coaches towards the use of ICT in education**

On the questionnaire which was filled in before the focus group interviews, the coaches were asked whether their training had resulted in a better use of ICT in education. Coaches were positive about the response they got in helping and training colleagues. A very diverse set of answers was given but the general feeling was that small steps were made in the development of the use of ICT. Most coaches referred to instrumental issues such as 'the use of digiboard', 'introduction to essential functions', and 'use of templates'.

Asked 'If you had the choice, would you spend more time as ICT coach?' the majority of the coaches (12) said 'no'.

*No, I don't want to spend more time. Teaching students is more challenging to me. Teachers often make mistakes in the use of the applications and it takes a lot of time to find out what they did wrong. You have to sit beside them to find out. This takes too much time. (Coach A1)*

The rest of the coaches gave a more positive answer.

*It will always work, however small every step may seem. Stimulating people motivated them to take little steps in the use of ICT. (Coach B9)*

On the questionnaire coaches, were also asked to state their opinion about the motivation of teachers to attend the training. Five coaches answered positively, but the majority of the coaches responded negatively. In their perception, teachers have no time to spend for training and some resisted learning new applications.

*I am not satisfied. Teachers wait till the last moment and then they want to learn everything in a short time. If the software has any bugs and restrains their creativity, they blame it on me. (Coach C1)*

The findings of the discussion in the focus group interview showed that, although the general feeling of the coaches was that the use of ICT applications had increased, they had doubts about the pedagogical use of ICT in education. The majority of the coaches said they did not work pedagogically. Most of the coaches stated that they liked the way they were working and that they were not motivated to spend more time on it.

*In my opinion we are in a transitional phase, the pedagogical aspect, the original objective of the ICT coaches was the pedagogical aspect. I have read somewhere that this was an objective but up till now nothing has come of it. I remember in the*

*first meetings that we had, this was about three years ago, that we talked about the pedagogical context. But then everybody had the feeling 'we first have to learn the buttons', otherwise it is of no use. (Coach D2)*

*Well in our institute we have started to see the ICT coach as a supporter to teachers, individually give them support and advise them.....but giving training in a pedagogical way, I have trouble to do that. This is playing a role now. When we started a couple of years ago I had no trouble giving support. I was able to start up with people and make them enthusiastic and I knew how things worked. But pedagogical support, I am not good at that. (Coach D1)*

Almost every coach was also active as a teacher and those coaches argued that it was important to work as teachers themselves in order to stay connected with the work field. Coaches had no motivation to work as an ICT coach on a full time basis. According to one of these coaches, the job as ICT coach 'is not a popular job'. Some coaches only wanted to spend more time if Senior Management would facilitate that.

*No, not more time. I would make better applications. Applications that sell themselves and that are built according to the rules. In that way you don't need people to take care of the consequences of bad use. At the introduction of every new application I think that the stage of information analysis was skipped and that the feedback was not used to build user-friendly applications. (Coach A6)*

The majority of the coaches were positive about the progress teachers were making in the use of the new ICT applications. However they also felt that teachers were forced to use the applications and that they had no choice. Older teachers were consulting the coaches more frequently than younger ones. Coaches had the feeling that teachers were motivated to use an e-learning application but that their ability to work with ICT in a pedagogical way was not high. The majority of the coaches believed that most teachers

used the e-learning application as a sophisticated explorer to store documents. Time pressure and roster problems amongst the teachers were seen as major problems to get teachers involved and motivated to participate in training and attend meetings.

*...well, I personally think that my teachers use the applications in a more easy way. At the moment there is a reversed situation. I am not working in the daily practice of teaching that much anymore and I see that the teachers have more experience to do things than I have. In some cases it was half a year ago that I did things and I saw that teachers' experience had increased .....*

*(Coach D2)*

*were they motivated to do it? (Coach D4)*

*well, yes, motivated? They think not....(Coach D2)*

*they are more used to it.....(Coach D1)*

*the resistance is gone. I feel that there is a slow change. I upload a lot of information; I get a lot of information. Teachers come to me with questions and want me to upload movies and asked questions how they can use it, slowly they recognise the added value of the applications, but this is only from the beginning of this term.*

*(Coach D9)*

*and do you have the same experience? (researcher)*

*Yes, I can agree with that (Coach D11)*

*Yes with <application> but not with <application> (Coach D2)*

*The older less experienced teachers ask the same questions over and over again because they don't use <application> for a certain time and than they have to search again and come back with the same question although you train them from time to time (Coach D11)*

*These are technical questions? (researcher)*

*Yes, it is mostly about buttons. They don't use the manual and they have to search a lot (Coach D11)*

#### **6.4.5 The behaviour of the ICT coaches in sharing knowledge**

The last theme in the interviews dealt with knowledge sharing. What was, in the opinion of the coaches, the best way to do that? The coaches had different views about the way knowledge could be shared. Eight coaches clearly stated that they preferred face-to-face meetings. Ten coaches preferred a more blended way of knowledge sharing and two coaches preferred a virtual channel. Two coaches did not know how to answer this question.

*In my view the best way at this moment is to meet face-to-face and then do something together. In the issues of the day it is difficult to take the time to surf and browse virtually. (Coach D12)*

The most frequently mentioned issue in meetings was the sharing of good practice as a possible way of sharing knowledge. Only one coach noted that this should be done with different faculties.

Only four coaches were positive about the role of the new virtual community. On the questionnaire, eleven negative answers were given about this virtual community. Four coaches answered neutrally.

When the ICT coaches responded to this subject during the discussion in the focus group interview, a diverse set of answers was given. All these answers showed that there was hardly any knowledge sharing practice between ICT coaches within the network. Coaches who met regularly in the faculty stated that they were meeting to organize the daily work but not to discuss issues about the ICT coach network. If there was a need to exchange things, then this was mostly technically oriented, like 'tips and tricks' on how to work with an application.

*How do you share and create knowledge? (interviewer)*

*Within our team (coach B9).*



*I also do a lot by myself and sometimes I exchange with others  
(coach B3)*

*If you meet as team, do you discuss matters about the ICT coach  
network? (interviewer)*

*Well, you cannot put it so directly (Coach B3)*

*We inform each other (Coach B10)*

*Well if we both are working in <application> than we sometimes  
have a look at each other's work (Coach B3)*

*That is because we are in one room here so we can ask everything  
to each other and share things (coach B9)*

*Yes, let see 'how would you do that' and.... (Coach B3)*

*And I note that, well, let's say colleagues of <faculty B>, that we  
profit more of this during network meetings than that you profit  
from things that happen in let's say <faculty C>. Sometimes we get  
ideas from them that trigger me, but most of the time it is more  
effective, last week there was this presentation at <faculty B>,  
that I think 'I can do more with that than the problems that  
<faculty C> is struggling with'. (Coach B5)*

*You just stated that you exchange knowledge in the pedagogical  
use, but do other faculties discuss the same issues? (interviewer)*

*Yes, they struggle with the same problems of 'how to use  
<application> in a good way for your education', and then we have  
to translate that, and you know, I want to use that in my daily  
practice, and this is more easy from colleagues of my own  
institute.....(Coach B5)*

*More recognisable, more near home (coach B3)*

*But, for example, for new video applications, which are very new,  
I realise that a university level is more important. We don't have*

*that know-how yet, and then I think knowledge exchange is very relevant. So especially in the case of a new application you have to exchange on a more university level, but if you have translate that to your own practice, than you need to discuss this with your direct colleagues who are in the same boat, that is my experience. (coach B5)*

*I fully agree (coachB3)*

*Me too (coach B10)*

One other issue was that the ICT coaches did not feel that they belonged to an ICT coach network. The term “ICT coach network” had different meanings to the respondents. For some it referred to the website of the coaches - ‘the e-place’, for others it related to the overall concept of a community. Coaches had regular contact with their colleagues in their own faculty but not with coaches in other faculties. The majority of the coaches stated that the practice of other faculties was too different from their own practice and for that reason the exchange of ideas did not take place.

The virtual community was hardly visited by the ICT coaches. They gave various reasons for this. Time pressure was said to be a major cause. Most questions coaches dealt with were about technical issues and the coaches mainly consulted the help desk for that. The majority of the coaches stated that they visited the website at the beginning of the academic year but not after that.

*Sometimes there are interesting things on the site, no doubt, and you can use it, but I simply have no time for that. (Coach C4)*

*No, I never visit this site. I am not going to search things. No, I go to the help desk, they know exactly where I can find things and with them I can meet immediately. (Coach C3)*

*In daily practice you want a quick answer and I cannot permit myself to dig into this website. I have no time for that (Coach C5)*

*So how often do you visit the site? (interviewer)*

*No, never (Coach C3)*

*Not much. I surf to every forum on the Internet about my hobby and private things, fantastic. At home I can spend a whole evening doing that but here I cannot permit myself to do that. (Coach C5).*

The coaches perceived the site as not user friendly. Some even spoke of chaos and said that it was difficult to search on it. The majority of the announcements came from the NMG and coaches stated there were too many of these announcements.

## **6.5. Interviews with the Network Managing Group**

### **6.5.1 Individual interviews with NMG**

Two years after the start of the ICT coach network three interviews were held with the staff members of the Network Managing Group. Within the NMG there was no clear picture of the ICT policy of the Executive Board and whether it was an important issue on the agenda. At the university, a project had been started in 2007 about Information Architecture and Management. This project was responsible to gear all the applications to one another within this university, not only the educational applications but also all ICT applications. According to the staff of NMG all these activities needed to be geared to one another more than they were at that moment.

*There is no clear picture. We from the NMG try to steer on certain things, e.g. how do you use a digital portfolio or the use of <application> but I think that our university is not good in formulating an integrated strategy for the university as a whole. There are attempts at a central level but the power lies at a decentred level. (NMG 1)*

*There is no framework. It doesn't exist. Well, and I think this is a very important condition if you want to get the right people and also Senior Management gets a sense of urgency and wants to acknowledge 'this must be a very qualified person because he is part of a change management strategy and a professional*

*development strategy'. And I miss that. At some institutes more than others, but in general I miss that. (NMG 2)*

The NMG stated that they were not responsible for the selection and appointment of coaches. Faculty Management recruited them partly on the basis of an ICT coach profile that was created by the NMG. This profile only stated what an ICT coach was expected to do and not what experience or educational background he or she should have. Although the NMG was not involved in the selection, they had a short interview with each coach. During their work with the ICT coaches they noticed diversity in experience, motivation and capability of the coaches.

*Well, you see, there is an enormous diversity of ICT coaches within the institutes. There are some very good and capable people, but there are also people of whom Senior Management has said 'Yes, we should appoint that ICT coach because he has some hours left'. (NMG2)*

The NMG perceived that not all coaches were aware of their task and that they had little support from Faculty Management. All three respondents were satisfied at the moment of the interview. They thought that all ICT coaches had made a major contribution to the implementation of the new e-learning application. They saw that the work of the ICT coach mainly was instrumental. They stated that without the ICT coach network it would not have been possible to achieve the use of the applications in all institutes.

The ICT coach profile stated: *"ICT coaches should have a good knowledge of the major developments of ICT in education and it is important that they share this knowledge with others by means of training, workshops and by walking around"*. The NMG perceived that the ICT coaches at institutes and faculties acted on their own because coaches were very hesitant to share knowledge due to their perception of different cultures and routines in other faculties. Coaches were, in their opinion, willing to come to meetings but this was very difficult for the coaches alongside their normal job as teacher.

The virtual community of the ICT coaches was set up as a place for knowledge sharing. The NMG stated that the community was only used to store documents, training material and minutes of some meetings. The created weblog was stopped and a new release of the virtual community was prepared. According to the NMG it would be difficult to attract more ICT coaches to the site.

*I think the E-place at this moment is mainly a place to store documents and nothing more....we have tried to make this a community and this did not work, mainly because we had too little time to do it, because this takes a lot of time. You see, they are ICT coaches and have ICT skills but they prefer sitting together in a room to talk things over. And each time they state that they like that, however they don't meet, this has to be organised by us.*

(NMG1)

#### **6.5.2 Group Interview with NMG**

A year after the individual interviews with the staff members of NMG a group interview was held with the Network Managing Group. The NMG consisted of four staff members and their team manager. The main objective of this interview was to gain insight into the initial strategy of the NMG to form the ICT coach network and to gather information about their experience after three years working with the coaches.

In this interview the NMG stated that the initial purpose of the network was that the coaches should act as transmitters between ICT and the teaching practice and that they were asked to transform the teaching practice from a more instrumental use of ICT to a pedagogical use of ICT. The coaches were asked because they had knowledge of e-learning applications. In the beginning teachers could consult the coaches in the use of the applications and the coaches were supposed to train their colleagues in the pedagogical use of ICT.

*I think, and we all agree with that, that the task that we had in mind as the most ideal situation, that we did not succeed in that. We all agree on that. Because it is not the right person at the right*

*place to reach that goal. But if you look at the small goal, the support to colleagues to help them in the use of the applications, most coaches succeed in that. (NMG 3)*

*But what is the main goal? (interviewer)*

*Well the main goal is the implementation of ICT in education in such a way that we improve education. And I don't know, perhaps a few, but the majority has no time to do that or because they don't have the skills to do that. (NMG3)*

The NMG had doubts whether they should give this task to the ICT coaches. In their opinion the renewal of education with ICT should come from curriculum committees and exam boards. The NMG said they did not have any influence over who was appointed as an ICT coach. This was a responsibility of Faculty Management. In certain cases the NMG had the feeling that good coaches were available but that they did not get enough support from Faculty Management. The NMG made several attempts to discuss this within the faculties. They all stated that they had to rewrite the profile of the ICT coach and then discussed this with the management of the faculties to seek the right person. But the NMG doubted whether the institutes would listen to them.

*We have tried to bring this matter into the open in several ways with Senior Management of the institutes, talking about what an ICT coach should do, but you know how it goes, it's no secret. There are people that are always fully booked with tasks and then you take a look and say 'Well, this is another task who would have time left to do this?' and if this is someone with a certain knowledge of ICT than it is all right. It is a hell of a job to deal with rosters and tasks and to get in all done within the institutes. And then not always the right person is chosen for the job. I don't have the illusion that if you would hand in a good job description to the management of institutes and ask them 'choose here your*

*ICT coach' that they will do so. You will never reach this ideal situation. (NMG4)*

The NMG stated that the current group of coaches were capable to train teachers how to use applications in an instrumental way but that they missed the knowledge and experience to transform the curriculum in such a way that ICT was an integrated part of it.

The original goal of the NMG was that ICT coaches would bring teachers from the Substitution stage to the Transition stage and finally to the Transformation stage (Itzkan, 1996). The members of the NMG group argued that policy and ICT played a minor role in the institutes and if there was a policy plan that the role of the ICT coach had no place in this document. In their opinion the institutes would never admit this, because in the perception of the institutes they worked a lot with ICT. The NMG said they were hesitant to discuss this matter with the faculties and institutes. They had the feeling that Senior Management would feel they were being pressed.

The NMG stated that their expectations during the formation of the network were that this group would professionalise education with ICT by sharing best practices.

*The original goal was 'practice what you preach'. That is why we formed the virtual community. And in this community the coaches can work together and exchange ideas and knowledge. That is what we mean by 'community'. (NMG2)*

The NMG felt that some of the coaches had this sense of belonging to the network but they realised that this was a very small part of the group. The NMG said that they could not force ICT coaches to participate in the meetings and the virtual community. Senior Management of the faculties and institutes should in their opinion stimulate the participation. Although the NMG made Service Level Agreements with institutes about facilitation and moderation of the network, they said they did not have any influence on the appointment and assignments of the ICT coaches.

The participation of the ICT coaches in face-to-face meetings and in the virtual community was moderated by the NMG group. Two kinds of meetings were offered, training sessions or workshops and evaluation or knowledge sharing sessions (see also section 6.3) An important objective of the meetings was to recruit participants to give them the opportunity to exchange ideas, ask questions and be informed about new developments.

*People want to see examples of others and we tried to facilitate that. This did not always succeed, but well, you have somebody to show and demonstrate what they have made in the e-learning system and what usability the system has. (NMG3)*

*It is also an approachable way to meet each other and inform each other about the last developments (NMG4)*

*And a place to grumble (NMG 3)*

*Yeah that too (NMG1)*

In the perception of the NMG the scope of the coaches might have been too narrow to see what was going on in other faculties and institutes. Members of the NMG said that this might have been one of the reasons why coaches did not attend meetings. Not because they were not motivated but because coaches had the feeling that it was not worth coming for. The NMG said that the most important reason not to attend meetings and participate in the virtual community was the lack of time.

## **6.6. Closing remarks**

The ICT coaches and Network Managing Group that are described in this chapter worked together in the implementation of four new digital learning applications. The coaches were trained and the coaches discussed the applications face-to-face in meetings and virtual in their online community. The next chapter will describe the findings of the density analysis of the ICT coach network and the analysis of the virtual community of the coaches.



# CHAPTER 7

## Results of Quantitative Methods

In addition to the baseline survey, as described in Chapter 5, two quantitative methods were used in this case study. In this chapter these two methods are described. In Section 7.1 the results of the Social Network Analysis of the network of the ICT coaches are presented. The findings of the activities in the virtual community of the ICT coaches are presented in Section 7.2.

### 7.1. Social Network Analysis of the ICT coach network

#### 7.1.1. Identifying key members of the network

The objective of this Social Network Analysis was to identify key members of the ICT coach network and discover whether ICT coaches had connections outside of their own institute or faculty. To explore this, a density analysis was made (see also Subsection 4.4.3). A list of all ICT coaches was placed in a spreadsheet based on the model of Cheuk (2006). An example of this spreadsheet is displayed in Table 17.

Coach Name: <input type="text"/>					
Coach	Location	With which ICT-coach have you had contact since the start of the network?	1 = every 2 months 2 = every month 3 = weekly 4 = daily To who do you send and from whom do you receive information about the ICT-coach network	With whom do you discuss issues about the ICT-coach network?	Score
A1	Campus A				
A2	Campus B				
A3	Campus A				
A4	Campus A				
A5	Campus B				
A6	Campus B				
B1	Campus B				
B2	Campus A				
B3	Campus A				
C2	Campus A				
C5	Campus B				
D5	Campus A				
D6	Campus 2				

Table 17: Example of spreadsheet for Density Analysis

Three questions were asked of the ICT coaches: 1. With which ICT coach have you had contact since the start of the network? 2. To whom do you send and from whom do you receive information about the ICT coach network? 3. With whom do you discuss issues about the ICT coach network?

The spreadsheet of the ICT coaches was filled in after each personal interview. The group consisted of 31 coaches from which only one coach was not available for interviewing. However this coach was willing to complete the spreadsheet for the density analysis. So the total sample of coaches for the density analysis was 31: 6 coaches from faculty A, 8 coaches from faculty B, 6 coaches from faculty C and 11 coaches from faculty D.

In order to measure the results of the questions which were asked of the coaches, a positive answer to the question was scored with points. The more important a question was for participation in the network, the more points were given. A positive answer on the first question was scored with 1 point. The second question determined the frequency that coaches had contact with each other. The more regular the contact the larger the score (every 2 months = 1 point; every month = 2 points; weekly = 3 points; daily = 4 points). The positive answer on the third question was given with 3 points. On the spreadsheet, the names of all 31 coaches were displayed and the city in which each coach was located (the university had two main campuses, campus A and B, divided over two cities). The maximum score a coach could receive was 8 points.

Coach Name: A2

Coach	Location	With which ICT-coach have you had contact since the start of the network?	To who do you send and from whom do you receive information about the ICT-coach network	With whom do you discuss issues about the ICT-coach network?	Score
			1 = every 2 months 2 = every month 3 = weekly 4 = daily		
A1	Campus A	1	3	3	7
A2	Campus B				
A3	Campus A	1	3		4
A4	Campus A	1	2		3
A5	Campus B				
A6	Campus B	1			1
B1	Campus B				
B2	Campus A	1			1
B3	Campus A				
C2	Campus A				
C5	Campus B				
D5	Campus A	1			1
D6	Campus 2				

Table 18: Example of scores in spreadsheet for Density Analysis

In the example in Table 18, coach A2 knows 6 other coaches in the ICT coach network. Three of them are from his own faculty. He has weekly contact with coach A1 and this coach was the only coach he discussed issues with about the ICT coach network. He also had weekly contact with coach A3 but never discussed such issues with this coach. He met coach A4 monthly at a faculty meeting. The other three coaches (A6, B1 and D5) he had only met at the start of the ICT coach network. So this coach had 6 ties in the ICT coach network. The intensity of his contact with other coaches is scored through the three questions and the total score is placed in a spreadsheet with all the results. To enable this spreadsheet to be read, the next section explains the differences between the horizontal and the vertical scores.

### 7.1.2. Example of horizontal and vertical differences

In the table below the differences are displayed between the statement of a coach and the statement of his/her colleagues. On the horizontal rows all the



in this network divided by the number of possible ties. In this example the network has 9 possible ties. The maximum density score is 1.

The results of all the scores of the coaches were totalled in a spreadsheet (see Table 20).



### 7.1.3. Findings on the density of the total network

In Table 20 all results of the density analysis are displayed. The coaches are grouped by faculty. Each faculty is separately displayed in Subsection 7.1.5 below. On the rows the intensity of each contact of a coach with other coaches is scored. The other coaches are displayed in columns 1 to 31. The total score of a coach is displayed in column 32. In the black bottom row and in column 33 the scores of the other coaches are displayed. The positive or negative deviation between column 32 and 33 is shown by a P (positive) or N (negative) in column 34. The percentage of deviation between column 32 and 33 is displayed in column 35.

The answers which the coaches gave about the frequency of their contacts with other coaches and the extent to which they exchanged and discussed information results in a weighted score per coach. The average score of all coaches is 31. The highest score was 65 from coach B7. This coach played a central role in the network because he was also the trainer of the trainers.

Some coaches judged their contact with other ICT coaches in a different way from their colleagues. This made no difference in the average score of all coaches, which was 31 in both cases. However, some coaches had more contacts than they thought they had. For example B5 had a weighted score of 23, but his colleagues together scored 45. In all cases the perception that the coaches had about themselves differed from that of their colleagues. If a coach had a more positive perception about his contacts a negative red mark is displayed. If the colleagues of a coach had a more positive perception a green mark is displayed.

A significant low score was found for coach C6. This coach had a few contacts from the time he worked with the first release of an e-learning application in another faculty. Although he remembered some names, of his colleagues only two coaches said they knew him.

The average number of ties was 9. That means that on average an ICT coach only ever had contact with 9 other coaches in the network (29%). The lowest

number from a coach was 3, the highest score was 31 (from coach B7). On average a coach had 4.4 ties outside of his own faculty. Discussions about the ICT coach network mainly took place within the coach's own faculty. Nine coaches said that they had had discussion with other coaches outside the faculty. Three coaches are shown to discuss the issues about the ICT coach network outside their own faculty. Measuring the density of a network gives an index of the degree of connection in a population. In this case, if a coach were to have had contact with all of his colleagues, the density would be 1. The average density score of the ICT coaches was 0.29.

To visualise the density of the total ICT network graphically, the spreadsheet in Table 20 was imported into UCINET software. This tool makes it possible to produce a graphic density diagram for the total and per faculty. The next section will show these diagrams.

#### 7.1.4. The graphic density of the total network

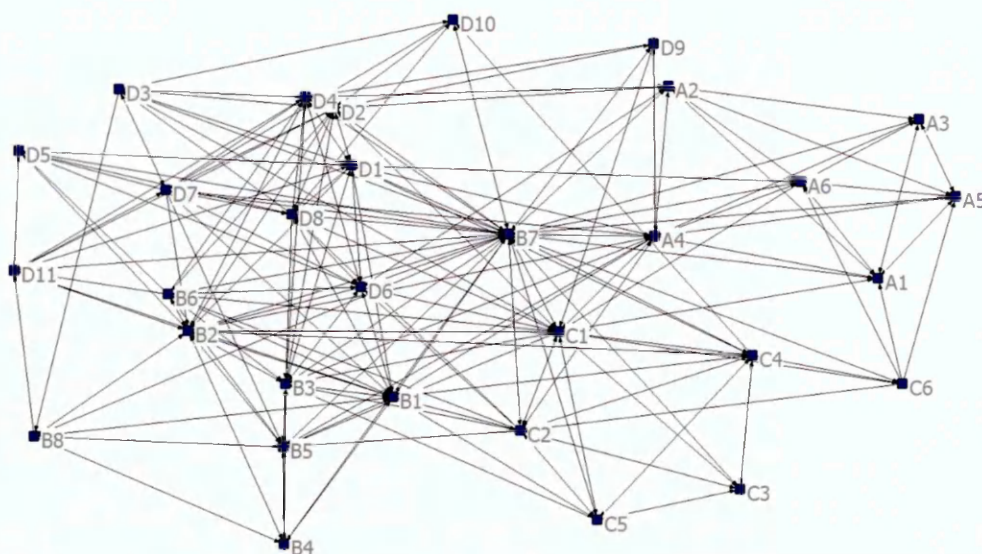


Figure 13: Density of the total ICT Coach Network

Figure 13 shows that most ICT coaches had contact with one or more coaches. Some coaches of faculty B were most active in the network. If question 1 *“With which ICT coach did you have had contact since the start of the network”* is left out, than the diagram shows a different picture (Figure 14)



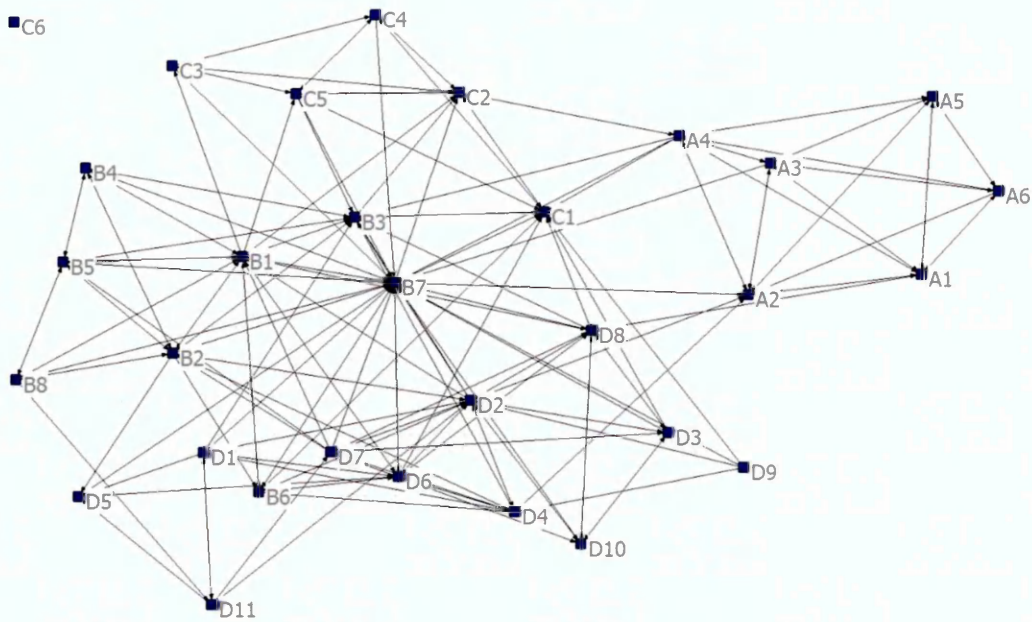


Figure 14: Density of the total ICT Coach Network without question 1

Compared with Figure 13, the network is less dense. It shows that faculty A is placed a little outside of the network, due to the fact that most coaches, apart from coach A4, had less contacts with other faculties. There was a less central role for coaches in faculty D. When displaying the results of question 3 *‘With whom do you discuss issues about the ICT-coach network?’* in a diagram, the picture looks quite different.

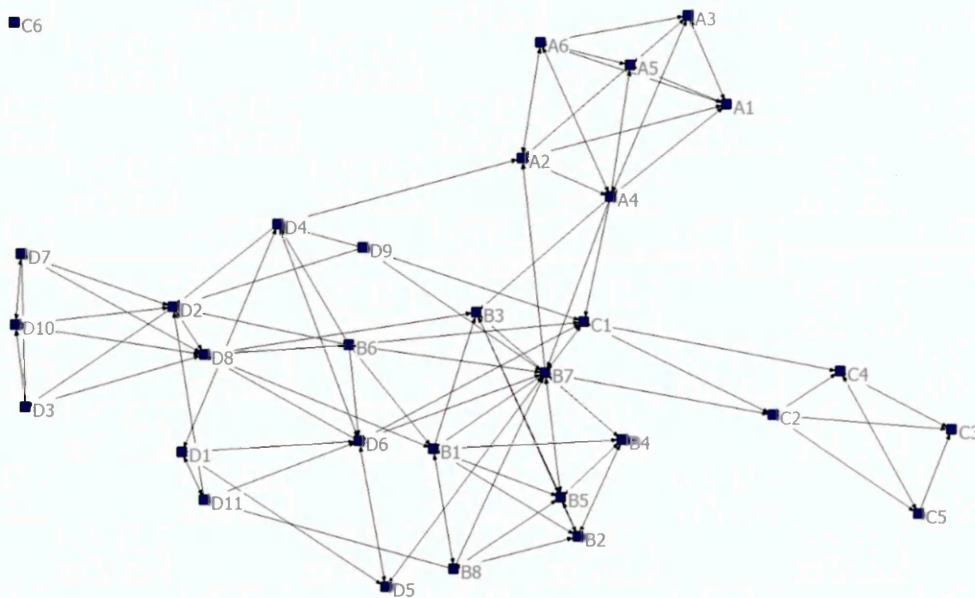


Figure 15: Density of the total ICT Coach Network without question 1 and 2

The diagram shows that a significant number of ICT coaches did not have any contact with other faculties. For example, the coaches in faculty A did not have contact with 11 coaches in the network at all. For faculties C and D respectively this number was 9 and 7. The best connected faculty was faculty B, due to the central role of coach B7.

Higher density in a network indicates enhanced relationships between coaches and can affect the development of a network. The research from Cheuk (2006:74) showed that discussing density and connection issues results in more online sharing, better understanding of one another, and an increased number of shared documents and projects. The findings of the individual and focus group interviews showed that the density of the network was never discussed between the coaches and the NMG.

The density analysis revealed the roles of the individual coaches. Cross and Parker (2004, p. 71) identify four types of people in networks; *Central Connectors, Boundary Spanners, Information Brokers and Peripheral Specialists*.

Figure 15 displays the network of coaches who said they had real exchange and discourse with each other about the ICT coach network.

*Central Connectors* in this case were coaches from faculty B, the coaches B7 and B1. Coach B7 was also the trainer in the network and had contact with every faculty. Therefore his central role in the network seemed obvious; he stated he had contact with almost everybody in the network because he was a trainer for the coaches. However discussions about the ICT coach network took place with only eight coaches.

*Boundary Spanners* have critical links between two groups of people. Coach C1 and coach A4 were Boundary Spanners. They connected the group of coaches from faculty A and B to the group of coaches from faculty C. Coach C1 also was the most active participant in the virtual network of the coaches. Another boundary spanner was coach D2. In the interviews he stated he had contact with coaches in faculty B in campus A (in the other city) at the start of the network. It showed that he played a central connecting role in his

faculty, and because of his former contacts, was able to connect with faculty B by means of coach B6.

*Information Brokers* are people in the network who are able to connect two people who have no direct contact with each other (Cross and Parker, 2004, p.77). Information Brokers can hold together entire groups of people in a network. In this case coaches D6, D2 and B1 played such a role. In the interview Coach B1 stated that he was willing to share knowledge and that he did not want to reinvent the wheel again. This coach was an important Information Broker in the network. He said he was motivated to do more outside the network as well, visiting congresses, exchanging ideas, and visiting special events in the university. Coach B6 linked to coach B7 and coach D7. These coaches were important boundary spanners in the network.

*Peripheral People* are isolated from the network. Coach C6 did not involve himself in the network at all and operated by himself in a small institute. He stated that a main reason for this was that his faculty used other applications from the rest of the university.

### 7.1.5 The density and deviation per faculty

#### Faculty A

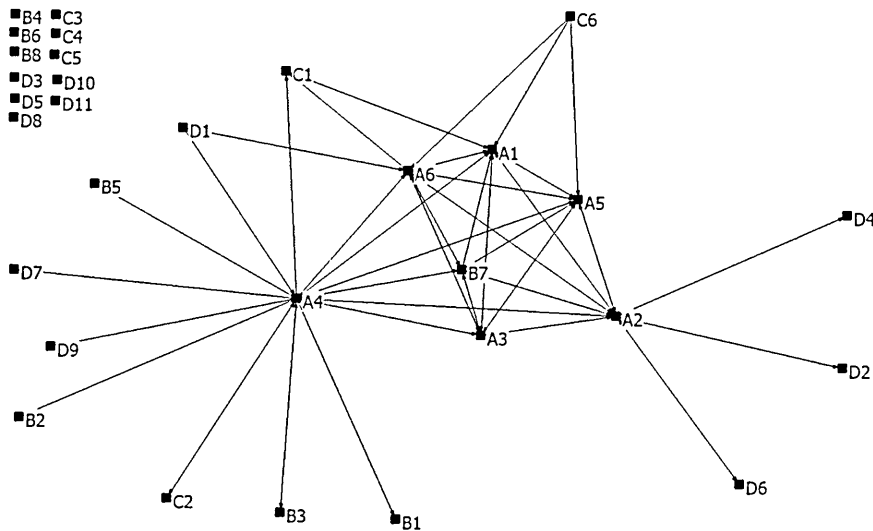


Figure 16: Density of the ICT Coach Network of faculty A

In faculty A, coach A4 played a significant role in the network. This coach was

able to connect colleagues from his faculty to other coaches. The coaches in faculty A mainly had contacts within their own faculty. The average number of ties was 2.8, which is the lowest of all four faculties.

### Faculty B

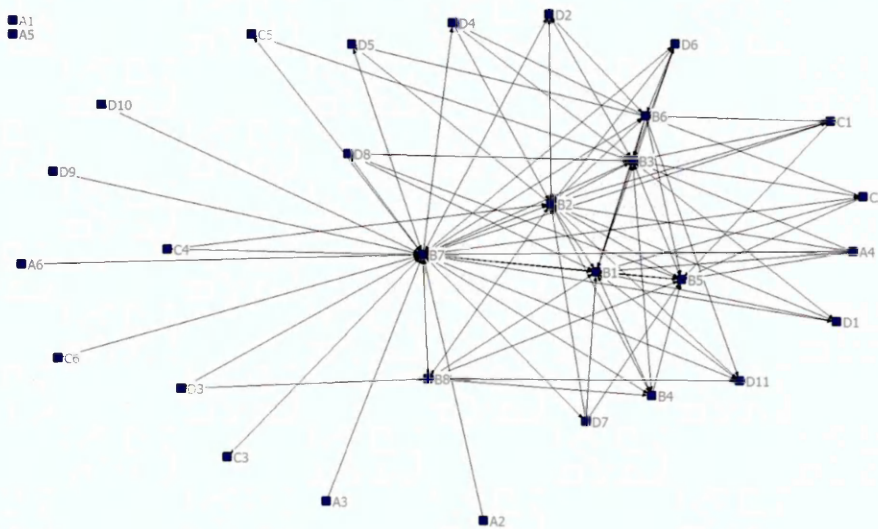


Figure 17: Density of the ICT Coach Network of faculty B

Coach B7 played a central role in the whole network and also in his own faculty. In faculty B the coaches had on average more ties outside the faculty (22.87). If we measure these ties with the presence of coach B7 then the number of ties outside the faculty is 14.8.

### Faculty C

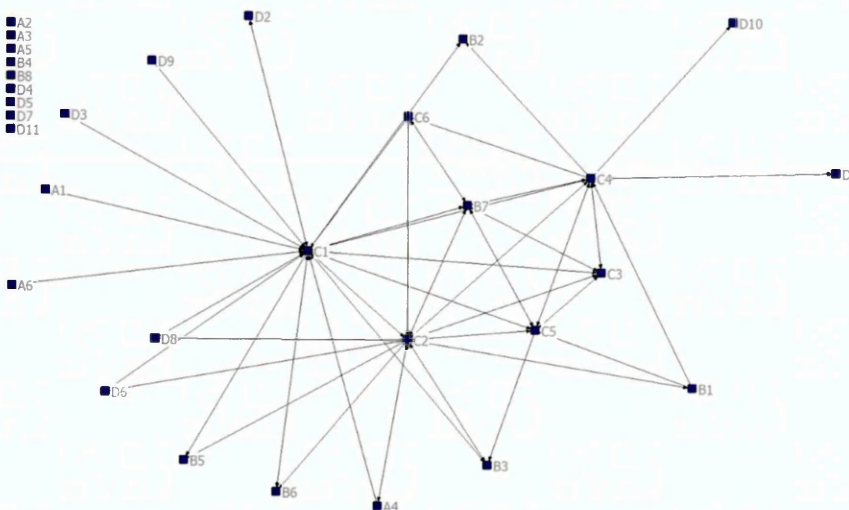


Figure 18: Density of the ICT Coach Network of faculty C

In faculty C, coach C1 played a central role. The density of the network within the faculty is 0.73. Coaches had an average of 7.6 ties

### Faculty D

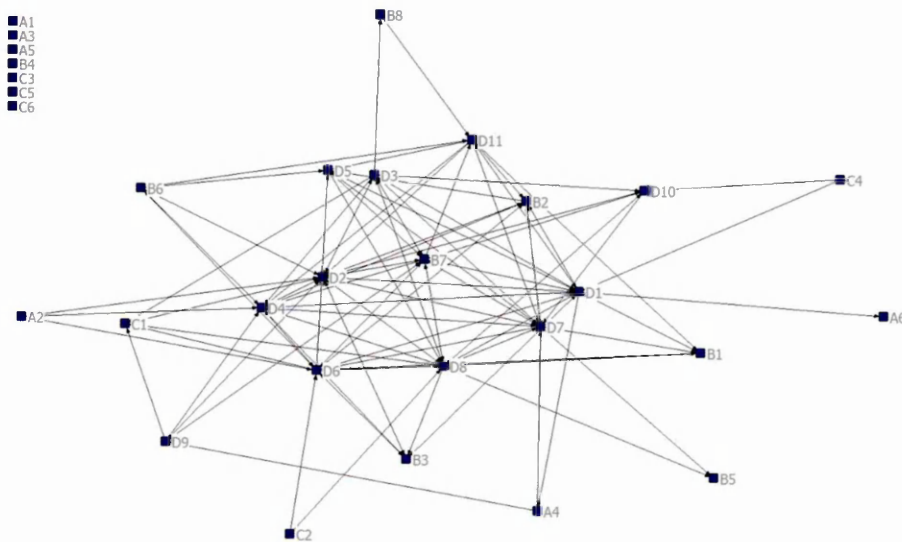


Figure 19: Density of the ICT Coach Network of faculty D

There is a more central role for coach D2 in this faculty. The density of the network in the faculty is the lowest of all faculties (0.5). Faculty D has 3.7 ties outside the faculty and the average number of ties is 7.6.

Table 21 shows all the results per faculty in one table.

	All coaches	Faculty A	Faculty B	Faculty C	Faculty D
Density	0.29	0.25	0.36 (0.27)	0.25	0.26
Density within the faculty		1	0.8	0.73	0.5
Average scores of coaches	31	37	34 (32)	19	28
Average scores of other coaches	31	37	40.8 (35.4)	21.7	25
Average number of ties	6	7.5	11.25 (8.4)	7.6	8.1
Ties outside faculties	4.4	2.8	22.87 (14.8)	4.3	3.7

Table 21: Density and average scores per faculty

It has to be remarked that in faculty B, one of the coaches had a significantly better score than all the other coaches in the university. This was due to the fact that this coach also was the trainer of the new e-learning application in

the university. The results of faculty B without his scores are shown between brackets.

## 7.2 Analysis of the ICT coach virtual community

In Chapter 4 the development of the virtual community of the ICT coaches and the design of the analysis of this website were described. In this section the results of this analysis are presented.

### 7.2.1 The online community of the ICT coaches

The main purpose of the site was 'to inform and to share knowledge'. The site was moderated by the NMG and was meant to replace all other digital communication. The main interface of the ICT coach community consisted of three frames (see Figure 20). In the main frame, the official announcements from the NMG were posted. On top of the frame users could find information about the upcoming meetings and a button to register for meetings. The right frame contained the posts from the ICT coaches. In the top right of the site, two links are placed to special themes: Captivate and Digital Assessments.

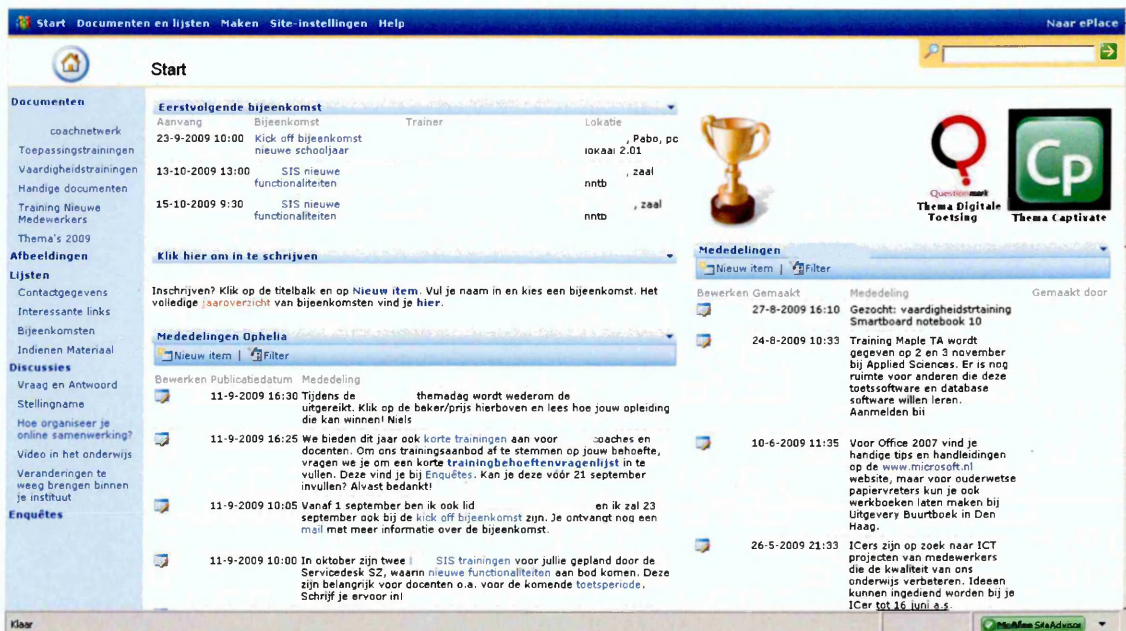


Figure 20 The homepage of the virtual community of the ICT coaches

The left frame contained the navigation to five sections: documents, images, lists, discussions and surveys.

*Documents:* The section Documents contained six subsections: about the ICT coach network, application training material, skills training, handy documents, training material for new staff, and themes 2009.

*Images:* This section contained all the images that are placed on the site, for example profile pictures and photos of classrooms.

*Lists:* The section Lists contained four sub sections: 1. *Contact* Here all the personal contact details and profile picture of the users of the site were published; 2. *Links*, interesting links to internal and external educational sites about e-learning; 3. *Meetings*, a schedule of all meetings that were organized for the ICT coaches; 4. *Submit Material*, a section where users posted documents for evaluation by the NMG.

*Discussions:* In this section sub sections posted where users could discuss specific issues. There was no possibility for synchronous discussion or online meeting. All discussions were a-synchronous.

*Surveys:* In this section surveys could be posted.

Registered members were not able to see whether other members were online at the same moment.

### **7.2.2 Moderation of the online community of the ICT coaches**

The moderation of the community of the ICT coaches was done by the NMG. At the start of the community four staff members of NMG registered and one of the four was the key moderator. The first moderator got another job within the university and a colleague replaced him in April 2009. At the start of this virtual community the moderator sent an introduction letter to all the ICT coaches who were not present at the kick-off meeting of the new academic year in September 2008. In this letter, the plans and activities were explained to the coaches and the purpose of the new virtual community. One of the issues was the explanation of a '*code of conduct*'.

### **7.2.3 Code of conduct of the online community of the ICT coaches**

This '*code of conduct*' consisted of six rules and was posted in the community.

- I practice what I preach regarding the change of the use of ICT in education.
- I visit the community site at least once a week.
- I will help colleagues with information, questions, and suggestions if possible.
- I start to register with my contact details (including a picture) and the writing of a introduction of myself.
- As process-moderator I expect the NMG to guard the quality and usability of the site.
- I expect the NMG to contribute with up to date information and training material that meets our needs.

### **7.2.4 Analysing the online community of the ICT coaches**

The evidence of activity in the community was collected by means of a weekly update of all postings in the community that was sent via an email alert. The community was based on the software of Microsoft Sharepoint and with this software it was possible for users to set receiving alerts in their e-mail box to see what new contributions had been made. Users were able to set preferences in the frequency of these alerts, varying from direct alerts to weekly or monthly alerts. On a weekly basis, all contributions of threads, announcements, discussions and documents were copied into an Excel worksheet for the analysis. A worksheet was made for every section in the community and every entry was recorded and copied into the sheet.

All activity in the ICT coach community was measured from the start of the community, August 2008, until the 1<sup>st</sup> of September 2009. Analysis shows that some documents had a posting date before the actual start of the community. These documents (24) were copied from the first release of the community. In



the monthly counting, these posts were counted as being posted in August 2008.

### **Statistics**

The moderator of the site could not give a reliable statistical overview of the number of visits and page views of the site. The reason for that was that the page views were regularly deleted by the system. In the period of measurement the system migrated several times to other servers and old statistical records were removed.

### **Sections**

There were seven sections with repositories of documents. Over a year, 116 documents were posted in these seven sections. In the period of fourteen months, in total 345 posts were made, 269 in 2008 and 76 in 2009. The moderator tried to create activity in the community by posing three questions within a period of three weeks. Three coaches reacted on these questions also within a period of two days after the question was posted. No other questions were posted after this period. These two coaches were the most active ones in the community during the rest of the evaluation period.

In the section “*Questions and Answers*’ the moderator posted a question directly to all coaches about what service the NMG should offer to teachers. There was not one response on this question. In total there were 35 postings in the discussion board. From all these postings, 23 resulted in a thread and 12 were unanswered. The longest thread in the community had 8 entries.

The chart below shows that the majority of the posts were done in the first half of the academic year. Hardly any postings were done in the second half.

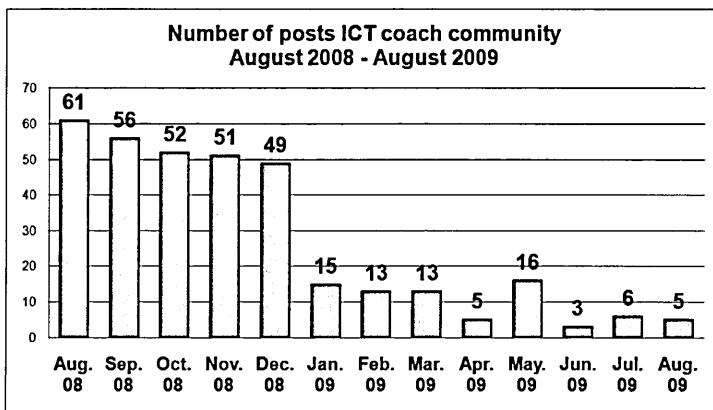


Table 22: Number of posts ICT coach community

### 7.2.5 Members, activity and postings in the online community

75 member accounts were registered on the site. Apart from coaches the registration came from staff members who were active with the ICT applications, such as ICT coordinators from institutes and Application Managers. Of this total number of 75 registered accounts, almost a third (24) posted something in the community.

All coaches were asked to register and to submit a profile with a picture. In January 2009, 4 months after launch, 22 coaches had registered. After one year, 26 ICT coaches were registered and 4 staff members from NMG.

The total number of postings was 345. From all the coaches, 10 made more than one post and from that number of postings, three coaches did 60%. The mean number of messages per user was 12.7. The total number of postings from the coaches alone was 86 and the mean number was 6.1. The highest number of postings from one coach was 23. In total 35 threads were started. 15 threads had more than one message. The maximum number of posts in one thread was 8. The mean number of messages per thread was 1.6.

14 coaches actively used the virtual community of the ICT coaches. Those coaches posted 86 messages, which was 25% of all the postings. Three coaches (A1, B3 and C1) were the most active ones. They posted 65% of all the postings that were done by coaches.

	Post	A	B	C	D	E	2008	2009
Moderator	237	20	61	49	80	26	170	67
Coach A1	10		7	1		2	7	3
Coach A2	1			1			1	
Coach A3	2	1	1				2	
Coach A4	2			1		1	2	
coach B3	23	6	10	4	0	3	16	7
coach B4	4		2	2			3	1
coach B7	5	2		1		2	5	
Coach C1	23	2	13	1		7	15	7
coach C2	6			4		2	6	
Coach C4	2			2			2	
Coach D11	5		5				5	
Coach D4	1			1			1	
Coach D8	1	1					1	
Coach D11	1			1			1	
IT coordinators	22		5	11	1	6	22	1
	<b>345</b>	<b>32</b>	<b>104</b>	<b>79</b>	<b>81</b>	<b>49</b>	<b>259</b>	<b>86</b>

A= usability of site
B= usability of applications
C= network and meetings
D= training material
E= pedagogical use of ICT

Table 23: Number of posts in ICT coach community per coach, per theme

ITEM	number
Total registered accounts	75
Registered ICT coaches	26
Registered Moderators NMG	4
Total postings	345
Postings by coaches	86
Mean number of postings per coach	4,69
Threads	15
Mean number of postings per user	12,7
Mean number of postings per thread	1,6

Table 24: Activities in the ICT Coach community

One of the postings in the community showed that the ICT coaches had found another means of online communication. In November 2008, one of the coaches reported the organisation of an online meeting via the e-learning environment of the university. After that they planned to meet via Skype with the use of webcams. Another coach reported the use of Adobe Connect and one of the moderators suggested the use of a web-based application. The moderator tried to start a discussion about the pedagogical use of ICT but this only resulted in two answers from the two most active coaches in the community.

*I am mainly busy teaching how to use applications to people who don't use the manual. They would rather ask first before they try. But when they have the skills they come with questions how to use the application in education. We should give more hands-on demonstrations about the possibilities to keep competences updated*  
(Coach C1)

*I am too busy with the technical side, as trouble-shooter. We try to change that.* (Coach B7)

### **7.2.6 Themes discussed in the online community of the ICT coaches**

To get an insight into the content of the messages, all postings were classified into five major themes:

- The usability of the online community.
- The usability of other applications.
- The network and the registering for meetings
- Training material
- The pedagogical use of ICT in education

At the start of the community there were some more postings about the usability of the site (9%). However the majority of the postings (30%) in the community were about the usability and use of the ICT applications that were used at the university. A number of coaches who were active in the community only used the website to sign up for a meeting or to announce their absence. In total 23% of the postings were about the network and the meetings. The moderators mainly did the postings about training material. Discussion and questions about the pedagogical use of ICT in Education formed 14% of the total postings.

Themes	Number	%
Usability	32	9
Usability of application	104	30
Network and meetings	79	23
Training material	81	24
Pedagogical use of ICT	49	14
	345	100

Table 25: Number of posts in ICT coach community per theme

Within the theme of pedagogical use there was one posting from the moderator that resulted in the highest response (8 entries, done by 7 coaches). After these entries the discussion stopped. The question of the moderator was: *What goal do you, as ICT coach, want to achieve in the short term with regard to the pedagogical use of e-learning by your peer teachers?*

The 8 entries are show below:

*I want to make teachers aware that the learning goals and attached pedagogical choice of <application> can be supported by using the right tools (e.g. choice of right template). (Coach A4)*

*Organise an exchange meeting for early adopters in <application>. The sharing of experience in the use of <application> in our own teaching practice. (Coach B5)*

*A colleague wants to record digital lessons and attached this in PowerPoint and a voice-over. <coach> and <coach> have expertise in this, they want to start today. (Coach C1)*

*I want to give training in the use of Smart boards for my colleagues: what are good tips and tricks? (Coach C1)*

*A teacher has found a right balance between the learning of a student in a physical learning environment and in a virtual one, so it is a matter of right balance in blended learning. In the daily practise an electronic learning environment will be used more. And the question is: What can be done better in an electronic learning environment? (Coach B3)*

*That teachers will guide students in the right way with <application> and also that they stimulate the cooperation of students with <application>. (Coach D12)*

*My short time goal is that every teacher is capable of using an application within his section. (Coach C2)*

*Goal: the use of other digital tools in education (films, digital blackboard etc). Better coordination of <application> activities in face-to-face meetings. Better use of knowledge and experience that students have gained in the teaching practise of teachers. (Coach B8)*

To enhance discussion the moderator posted three theses about the pedagogical use of ICT by the ICT coaches. The moderator specifically asked coaches to react. Two coaches reacted to these theses.

One thesis was: 'As an ICT coach I am too little involved in the pedagogical use of ICT in education'.

*I challenge you to react to this thesis and submit whether you agree or disagree with this thesis. If you don't have an opinion about this, please let me also know. And don't forget to submit your arguments that support your comments.*

(moderator)

*Perhaps ICT coaches could video record some training of themselves and share these together to create new knowledge on ICT use for all employees and students in a relaxed way.*

(Coach C1)

*As far as I am concerned I think the scales are tipped to the more technical use, trouble-shooting so to say. We try to change that by introducing some challenging projects about the use of ICT.*

(Coach B7)

Another thesis was posted about the efficiency and effects of the use of ICT in education. The moderator took the position that the use of ICT costs more

time and money than the effects would justify. Three coaches were active in discussing these theses. These were also the coaches that were the most active ones in the whole community.

### **7.3. Closing remarks**

The network of the ICT coaches and the Network Managing Group worked together in the implementation of four new digital learning applications. The coaches were trained and the coaches discussed the applications face-to-face in meetings and virtually in their online community. In this chapter I have analysed the density of the network and the activities in the online community.

The main findings of the analysis of the social network of the coaches are:

- The ICT coaches mainly had contact with their colleagues from their own faculty.
- Because coaches mainly worked within the faculty, the density of the network was low.
- In a low-density network the social relationships in the network are also very low. Social relationships of the coaches in this network mainly existed within their own faculty.
- Knowledge about the use of ICT in education was hardly discussed in the network.
- The results of the density analysis per faculty show that the coaches of faculty A (Business Administration) and faculty C (Engineering) were low because in each faculty only one coach was active in the network. The highest density was measured in faculty B (Education). The density in this faculty was positively influenced by the presence of coach B7. Despite the fact that faculty D had the largest number of coaches, this faculty (Development & Society) had the lowest density. The greater number of institutes within the faculty might have influenced this.

- The majority of the coaches had a different perception of their contacts in the network. The main reason was that the majority of the coaches had only met other coaches at the time of the introduction of the network and had not met anymore since then.
- Only three coaches said they had discussed issues regarding the domain of the ICT coach network. This means that there was no shared domain about the use of ICT in education in this ICT coach network.

The analysis of the online community of the coaches made clear that:

- The ICT coaches did not use this online community. There were a few postings from coaches but the majority of the coaches seldom or never visited the virtual community.
- From all discussions on the online community most of them were about the usability of ICT applications which were used in the university.
- Pedagogical use of ICT in Education was not discussed much.

In this chapter and the former two chapters the findings of the qualitative and quantitative methods of data collection were presented. In the next chapter the findings are discussed.



## CHAPTER 8

### Analysing the case

#### 8.1. Introduction

In this chapter the findings of the study that were presented in the previous chapters are discussed. The chapter starts with a short section in which some considerations are presented to rephrase the original research question and think about themes that emerged from the findings about factors that influence the development of knowledge networks. Section 8.3 presents the arguments for one of the main conclusions, namely that the ICT coach network was not a community of practice. The section will present a discussion of the establishment of the network of the ICT coaches and whether this network developed as a community of practice or as a network. To discuss what really happened in the network a research diagram is developed, which embodies seven themes that emerged from the findings. In section 8.4 this diagram is presented and discussed with arguments about what factors are important in developing knowledge networks.

#### 8.2. Considering the research question

At the start of this study the main focus was on knowledge management in relation to face-to-face and virtual networking in order to develop pedagogical change in a university. The main research question was:

*“What is the role of face to face and virtual networking in relation to creating and sharing knowledge for the development of ICT use in teaching?”.*

The original intention of the university was to set up a network in which ICT coaches were brought together to share and create knowledge about the use of ICT in education. The additional research questions focussed on the development of knowledge and practice and how this knowledge was created and shared within this group of ICT coaches and with the teachers of the university. What was found was that a strong network did not develop. The question was asked why this happened and what hindering factors caused the

limited development of the network in this case. Interesting themes emerged in the findings which led me to the research question being amended.

One of the key findings was that, while knowledge exchange between one or two coaches in different faculties developed with regard to the use of ICT in teaching, in general no new knowledge about this subject was created and shared in the period of this case study. After three years the conclusion was that the practice of the ICT coaches mainly focussed on instrumental knowledge of the ICT applications that were used in the university. The coaches mentioned no stories of successful implementation of pedagogical use of ICT. In order to explain what really happened, therefore, the original question was rephrased to:

*“ What factors facilitate and hinder the development of knowledge networks in the development of ICT use in teaching in an organisation such as this one?”*

Although a kind of network with ICT coaches was created in this university, the data show that the network was weak and was certainly not a community of practice. The arguments for this are given in the next section.

### **8.3. A community of practice or a network?**

The interviews with the NMG made it clear that they had a vision and a sense of urgency to transform teachers' use of ICT in education. The growing drive of university policy for the use of ICT in education and the implementation of four new ICT applications in the university meant that it was seen as necessary to enhance the use of ICT in education, not only in an instrumental way but in a pedagogical way. The pedagogical use of ICT is to be understood here as the last stage in the transformation process, the moment that the use of ICT has developed from only an instrumental use to a stage where ICT is fully integrated in the curriculum. In this last stage the curriculum would need to be rewritten if ICT was no longer available.

To enhance the use of ICT in education a group of coaches was formed. These coaches were to train teachers in the new ICT applications that were introduced in the university: a new e-learning application, a new student

information system, digital portfolios and software for digital assessments. Another important objective of the NMG was that the coaches would form a community of practice to create and share knowledge about the use of ICT in education.

Wenger, McDermott and Snyder (2002:27) provide a framework with three structural elements of a community of practice: the Domain, the Community and the Practice. Furthermore they give 'Seven Principles for Cultivating Communities of Practice' (Wenger et al, 2000: 51-64). The findings in relation to this framework and these principles will be discussed now.

Was there a Domain?

The knowledge domain is the starting point for learning in the community and gaining new knowledge. Participants bring in their tacit knowledge about the practice of the domain and exchange these practices. Orr (1990) demonstrated the success of telling stories as a means of learning about the practices in the workplace. The knowledge that can be shared includes both tacit and explicit knowledge (Sachs, 1995:38), and the creation of new domain knowledge takes place through the learning of 'know-how' in communities where members experience key issues and problems that can be solved (Wenger et al, 2002:32). The Domain of a community of practice creates common ground and a sense of common identity (Wenger et al, 2002:27).

The data show that the domain was not described clearly. The vision of the NMG was to enhance the use of ICT in education in a way that teachers should change their way of working by maturing from a Substitution stage to the Transformation stage (Itzkan, 1994). The objective in the last stage was that the teachers would make an integrated use of ICT in their teaching practice, that is a pedagogical use and not only an instrumental use. The job profile of the coaches stated '*know-how in the use of ICT*' as a qualification for the ICT coach. In a note from the NMG about the profile of the ICT coaches it was explicitly formulated that the ICT coaches were asked mainly to focus on digital pedagogy and not only on the instrumental use of ICT in education.

However in the interviews the coaches mainly advocated the instrumental use of ICT applications and not the pedagogical use. During the interviews and the focus group discussions the respondents offered different opinions about their assignment. Some operated from their own insight or attitude towards the job. Others did it based on the profile that was sent to them. There was no written assignment.

The domain of a community of practice is an area of knowledge that brings the community together, and it defines the key issues that members need to address (Wenger, 2004:3). However the coaches were brought together in the first place to train their colleagues in the use of ICT. The original objective of the NMG was that the coaches would spread the best practice of the pedagogical use of ICT like a stone in the pond or, as one of the NMG staff members said, like an inkblot. However this was not achieved. The domain of the community of practice was too thin. Wenger et al (2002:21) state that 'domains of knowledge become focal points for connecting people in different units who are working on potentially related projects'. However the focus of the coaches was different from that of the NMG and the coaches of different faculties were not working together. The focus of the network was on two things: the training and the creation and sharing of knowledge. However the coaches were not aware of this initial plan of the NMG. The interviews showed that the main issue was about practical applications. The majority of the coaches stated that they should help colleagues with the use of new ICT applications and in the meetings and online discussions no one referred to the transformation process that the NMG had in mind. The fact that the coaches were responsible for the implementation of four new applications meant that often the emphasis was placed on training and technical skills rather than on pedagogical design. Most ICT coaches said they were technically oriented. The findings showed that there was not a shared domain of knowledge about the transformation of education with ICT.

Was there a Community?

A strong community fosters interactions and relationships and it encourages a willingness to share ideas (Wenger, 2002: 28). To build a community of

practice, members must interact regularly on issues important to their domain (Ibid. p. 34), and success depends largely on the personal passion of the members. Wenger et al (2002: 36) state that, although members may be self-selected or assigned, they should be personally engaged on a voluntary basis. Striking words in the above sentences are ‘regular interactions’, ‘relationship’, ‘personal passion’, and ‘engaged’.

*Passion and engagement.* It was expected of the coaches that they were experts in their domain, had knowledge and insight about the most important developments in the field of ICT and learning, and were expected to share that knowledge with the other ICT coaches. The ICT coaches all had a more than average experience with computers and said that they liked to use computers. There was a willingness from the coaches to share ideas. However the motivation to participate in the ICT coach network was hindered because most coaches perceived that Faculty Management did not support what they were doing. Brown and Duguid (1991:45) advocate that organizations must provide support that corresponds to the real needs of the community rather than just to the abstract expectations of the corporation. However the data show that coaches lacked support from Faculty Management and some coaches were forced to take this role because it fitted in the plans of Faculty Management. As an example one coach stated that the job of ICT coach was not a popular job. According to Wenger et al (2002:213-216) it is paramount that senior managers encourage participation in a community of practice and ensure alignment of organizational systems and policies to make this possible. Communities benefit from managers in the organisation who make it possible to provide funding and legitimacy for community activities (Wenger et al, Ibid); but in the first place, knowledge sharing and creation need individuals who contribute voluntarily and with a passion for sharing (Kazi and Wolf, 2005:282). Some coaches said it de-motivated them to attend meetings because there was so little interest from other colleagues. To encourage engagement Wenger (2004:4) suggests energizing communities by bringing in new ideas, inviting speakers, but most important is to stimulate practitioners to engage directly with one another. However interviews with coaches revealed that their normal job as teacher was privileged above the ‘side-job’

as ICT coach. Most ICT coaches were fully occupied as teachers and were more or less forced to do this job alongside their normal job. Coaches were assigned with a different number of working hours for the job as coach; some had a more intensive job as teachers than others. This made it difficult for coaches to have regular contact and develop relationships.

*Regular interaction and relationships.* Cross et al (2001: 100) write that a significant component of a person's information is based on the relationships that he or she can use for own information needs. Relationships are critical for obtaining information, solving problems and learning how to undertake work (Cross et al, Ibid). Relationships are also necessary to develop a set of socially defined shared practices in a specific domain (Wenger et al, 2002:38).

The coaches did not meet very often, and if they had contact with each other it was mainly with colleagues from their own faculty. The density analysis shows that the network had a low density. The average number of contacts that coaches had in the network was 9. However one coach who, as a trainer, had contact with all coaches positively influenced this number. The data showed that coaches from faculty A mainly worked within the faculty with little or no contact with coaches from other faculties, and that one coach from faculty C entirely worked alone. Only when the NMG organized meetings for ICT coaches did they have contact with each other. However the coaches perceived it difficult to attend the meetings. In this case lack of administrative support also caused roster problems, and the reasons why such a small number of coaches attended the meetings mainly had to do with roster problems. Granovetter (1973) argues that distant and infrequent relationships, are efficient for knowledge sharing because they give access to novel information by bridging otherwise disconnected groups and individuals in organizations. However because of the balkanised structure of the university (Hargreaves, 1994, pp. 213-215) most coaches hardly had any contact with other faculties. This made it also difficult to judge whether they could benefit from the ICT coach network. A conclusion from the data is that coaches only had limited interaction with each other and therefore it was difficult for them to develop relationships with members of the community.

Did the coaches have shared practice?

For Wenger et al (2002:83) the key issues for the practice component in a CoP is to discover what knowledge should be shared and how. Management could encourage this by mentoring the members of CoPs and in rewarding people for directly sharing knowledge with others (Hansen et al, 1991:109). For Wenger (1998: 130-131) sustained mutual relationships and shared ways of engaging in doing things together are critical characteristics of a CoP. According to Wenger et al (2002:29) practice is a set of frameworks, ideas, tools, information, language, stories and documents that community members share. The task of a community of practice is to create a baseline of common knowledge (Wenger et al, 2002:38) that creates a common foundation, allowing members to work effectively.

Interviews with the NMG showed that the NMG put a strong mark on the way of working and the coaches did not always accept this. The ICT coaches were not involved in the development of the network and did not share knowledge in documents or discourse. The density analysis revealed that only a few coaches said that they exchanged and discussed knowledge about the network and the interviews showed that this was mainly about applications. The NMG and a few non-coaches placed most documents that were uploaded to the virtual environment.

The most mentioned reason why coaches did not have contact with other faculties was that they perceived the culture and way of working in faculties as too different. Some ICT coaches stated that the different cultures of institutes and faculties restrained them to visit ICT coach meetings. The NMG acknowledged that ICT coaches had a view limited to their own faculty and judged it as a normal fact that coaches perceived their work as different from the practice of other institutes. The NMG had a broader view of the strategy and policy of the university and from that perspective they tried to motivate the ICT coaches to step out of the boundaries of their own institutes. However the findings of the data show that the ICT coaches had no shared practice and no mutual understanding of the practice in the use of ICT in education.

Was this group of coaches a community of practice?

The discussion above about the basic components of CoP shows that it is hard to believe that the group of ICT coaches formed a community of practice. In practice, the terms networks and communities of practice are often used for the same concept. However, Denning (2005: 151) differentiates between them. In his view a community of practice has a domain of information or knowledge or activities of common interest, whereas a in a network members just want to stay in touch with each other. In comparing characteristics of networks with communities of practice Wenger et al (2002:43) state that communities of practice are 'about' something and that a shared interest alone is not enough to be a community of practice. In a community of practice, there is more passion for the focus of the community whereas in networks members focus on the usefulness for each other. Wenger et al (2002: 51) give seven principles for cultivating a CoP. First, a CoP must be designed for evolution, that is, communities must grow naturally and not be created from scratch. Spontaneous growth had to come from the ICT coaches as the most important members using the structures that the NMG had created. These structures were meetings, virtual environments and events. These were created by the NMG but the coaches did not use them intensively. Second, there has to be an open dialogue between inside and outside perspectives to make the stewarding of knowledge effective. However the coaches hardly had an outside perspective because most coaches said they had no knowledge of other organisations of higher education. Third, a community should invite different levels of participation. In the ICT coach network there were only two levels of participation, the small core group of one moderator, one or two active coaches and the rest. As shown by the density analysis too many coaches were peripheral. Fourth, a community of practice should develop both public and private community spaces. The NMG created an open virtual environment for coaches, teachers and ICT coaches but there was no connection between the two spaces and the coaches hardly visited this space. Fifth, a community should focus on value. Wenger et al (2002:61) argue that a key element of designing for value is that the members must be explicit about the value of the community. This was not achieved



because the coaches had no sense of belonging. Sixth, familiarity and excitement must be combined. In the findings no such remarks were made. Coaches did not feel the familiarity to meet, to share, to drop in ideas. The last and seventh principle is that a rhythm of the community has to be created because this is the strongest indicator of its aliveness. This ICT coach network had no rhythm in meetings, events, discussions and discourse.

From all the remarks about the domain, community, practice and the seven principles of cultivating CoPs it can be concluded that this ICT coach network was not a community of practice. However could this ICT coach network be defined as a network?

Was this group of coaches a network?

In the literature the word community and network are often used for the same concept. One of the differences given by Denning (2005:151) is that network goals are self-determined, usually without authorization and that community's goals are decided by the members, and permitted by whoever is in authority. Wenger and Trayner (2011) prefer to think of community and networks as two aspects of social structuring, which require different forms of developmental work. Their focus in networks refers to a set of nodes and links for information flows and they see the community aspect as the development of a shared identity and a collective intention to steward a domain of knowledge into an organisation

In this case the group of ICT coaches were not involved in decisions concerning the objectives of the network or community. According to van Aalst (2003:37) networks can have leaders but on the other hand have a degree of self-management. The participants share a common purpose and stay active as long as it delivers them a benefit. From the density analysis and the interviews it was concluded that apparently the coaches were not active because this common purpose and personal benefit was not recognized. For Denning (2005:151) one of the main differences between a network and a community is that network members want to stay in touch with each other and that a shared domain of knowledge is the main factor to bring people

together. Denning also writes that the passion for members in a community is the focus on the domain, for network members the motivation to participate is the usefulness for each other (Denning, 2005:151). But as has already been shown, neither was the case in this group of coaches. If, as Perkins (1999) and Buchberger et al (2005) argue, social construction of knowledge is a key condition for the establishment of networks one could say that the group of coaches was not a network because social construction of knowledge did not take place. Also van Aalst (2003:37) distinguishes three types of networks: the community of practice, a networked organisation and a virtual community. The initiative of the NMG was to call it a network and the people that were asked to participate were defined as 'ICT coaches'. However the objective was to share and create knowledge in a specific domain, that of ICT in education. Sliwka (2003) argues that networking provides innovators with opportunities for learning skills from their colleagues. There were some elements of the skills function (Dalin, 1999: 349) in the ICT coach network where coaches exchanged instrumental knowledge of applications.

Although the network of ICT coaches was not strong, it had aspects of nodes and links, and it also had aspects of a network of relationships. The conclusion of this discussion is that this group of coaches was not a community of practice. The group had aspects of a network but did not achieve its full potential. The next section discusses what really happened in the network of the coaches.

## 8.4. What happened in the ICT coach network?

### 8.4.1 A model with seven themes

The original research questions aimed to explore how the knowledge and practice would develop in the ICT coach network and how knowledge was created and shared with regard to the use of ICT in teaching. Analysing the findings, a number of factors were found which influenced why this ICT coach network did not develop in the way it was originally intended by the NMG.

These factors are:

1. There was little or no management support and leadership.
2. Not all ICT coaches were chosen correctly to advocate and bring about change in the use of ICT in education.
3. The Executive Board and the NMG did not always communicate the main objectives of the change.
4. A community of practice was not built; the network of the coaches was not strong.
5. There was too little social interaction in the network to create and share knowledge.
6. Coaches had a preference for face-to-face contact above virtual contact.
7. Most ICT coaches focussed on the instrumental use of ICT in education.

These factors that emerged are brought together in a research model with seven themes (figure 23): (1) Leadership and management support; (2) Identifying change agents; (3) Communicating the change; (4) Building the network (5) Creating new knowledge through social interaction; (6) Face-to-face versus virtual networking (7) Changing Behaviour.

The first themes (numbers 1,2,3 and 4) are displayed in Figure 21 and relate to the change process in the university. The themes 5,6, and 7 are depicted in Figure 22 and relate to the change of knowledge, attitude and behaviour. Finally figures 21 and 22 are brought together in a change model in which the main underpinning theories, the Theory of Planned Behaviour, and the Practice based Perspective of Knowledge are added.

#### The change process (themes 1,2,3, and 4)

In figure 21a the change process of the university is displayed. Leadership and management support (theme 1) is necessary, not only to identify Change

Agents but also to communicate the change and gain commitment to the change. Communicating this change (theme 3) needs to be done by management and by change agents. Therefore communication between change agents (theme 2) and management takes place in two directions. Together they build relationships to create a shared commitment about the objectives and vision of the change. This commitment is brought together in a Community of Practice (theme 4) where members create a sense of belonging in a Social Network.

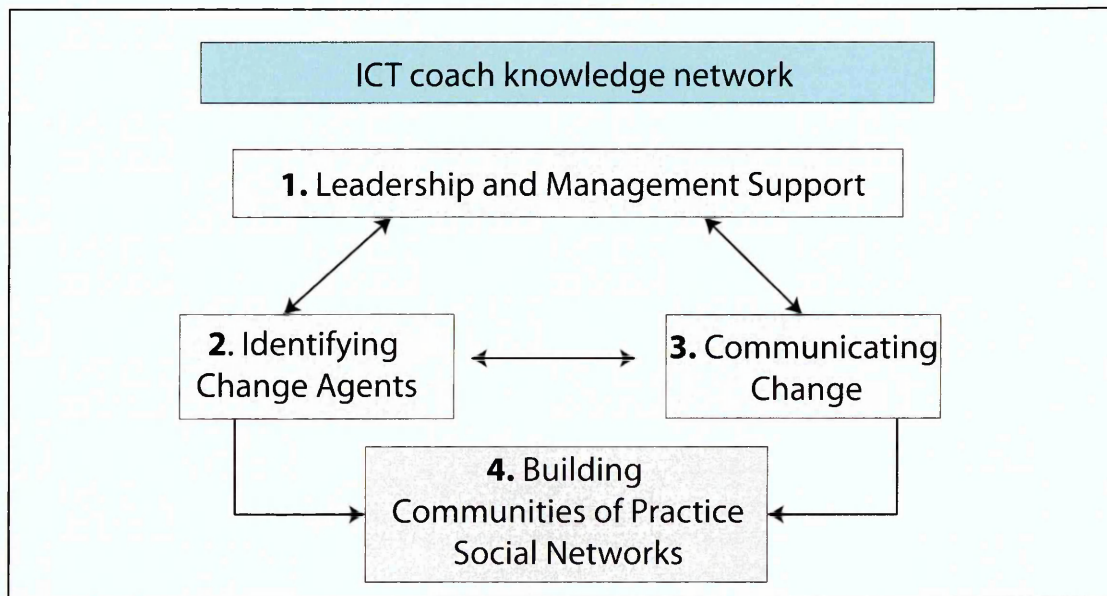


Figure 21: the Change Process in the University, Schimmel, 2013

### The change of knowledge, attitude and behaviour (themes 5,6 and 7)

Building a domain of knowledge about ICT in education was one of the main objectives of the Network Managing Group. ICT coaches were expected to work together in a Community of Practice and form a social network in order to create new knowledge (theme 5) and steward this into the organisation. This social construction of knowledge is the important link between figure 21 and figure 22. The network of the coaches was expected to form an important link in the process change of attitudes and behaviour among teaching staff in the university. The coaches worked together face-to-face and/or virtually

(theme 6) and based on their new knowledge they will evaluate their attitude, which may lead to the intention to change behaviour (theme 7).

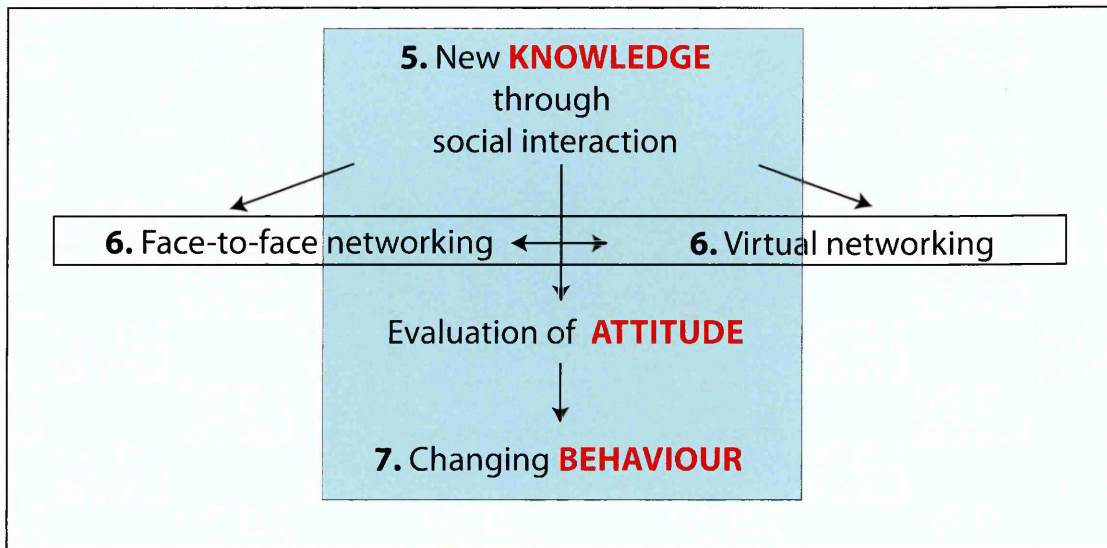


Figure 22: the Change of Knowledge, Attitude and Behaviour, Schimmel, 2013

The starting point of the theoretical framework of this study is Social Constructivism (Vygotsky 1978), supported by the theory of Planned Behaviour (Fishbein and Ajzen and (1975, 2010) and the Practice Based Perspective of Knowledge (Hislop 2005). The two figures 21 and 22 are brought together and the theories above are added to a final research model (Figure 23).

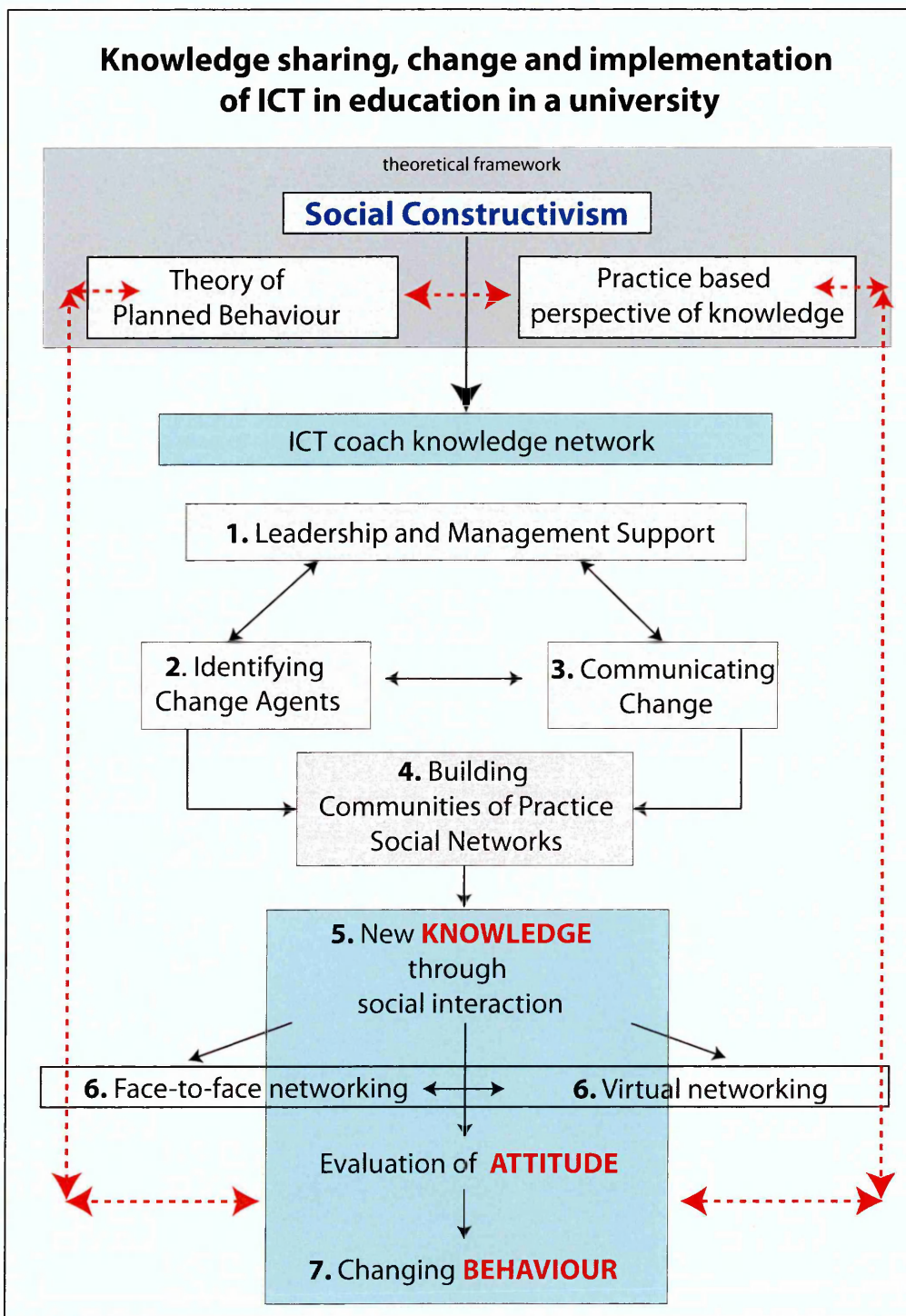


Figure 23: Change Model, Schimmel, 2013

In figure 23 the basic argument is that if attention is given to the underlying themes (1-6), the attitude and the change of behaviour (7) is more likely to occur. The red arrows in this model point in two directions and show that the process of change, knowledge creation, evaluation of attitude and change of behaviour is an on-going process. The strong relation of the creation of

knowledge as an on-going process in the relation of knowledge-attitude-behaviour is brought together in the Model of Changing Pedagogy with the use of ICT in Chapter 9, Figure 24). In the next sub-sections the seven themes are discussed.

#### **8.4.2. Theme 1: Leadership and management support**

In this first theme of the research model the role of leadership and management support is explored.

Bolden et al (2009: 271) found that employees in 12 UK universities preferred an 'emergent' leadership whereby individuals, groups and teams are willing to take responsibility and generate new ideas and initiatives. According to Kotter (1996:26) a change leader establishes the direction, aligns the people and motivates and inspires them. Hayes (2002:105-112) writes about the role of leaders and management in aligning people, empowering others to make the change happen, motivating and inspiring people.

In this case some coaches and NMG perceived the leadership as 'top-down', a formal and intentional leadership orchestrated from the top. The ICT coaches and the NMG said that they missed inspiration from Faculty Management. However support by Senior Management in any changing organisation is important to make change happen. People who are responsible for the change, in this case the NMG, need the authority and power to lead that change, which includes being involved in the appointment of the people.

Little or no such support from Senior Management was found in this case. Most ICT coaches missed a strategy and a project plan. Although there was a policy plan the coaches were not clear about it. In building on enthusiasm leaders can give participants hope and energy that the change will be valuable for the organisation (Fullan, 2001). Fullan (Ibid, p.4-5) stresses that leaders should understand the change and mobilize people's commitment to put all their energy into actions that are made to improve things in the organisation (Fullan, 2001:9). After that, it is necessary to form a powerful coalition to advocate and implement the change (Hayes, 2002: 111). Hayes advocates determining who is affected by a change, and identifying the stakeholders in

terms of commitment and ability to influence the outcome of the change. Once the stakeholders are identified it is important to have a dialogue from diverse perspectives between the potential members of the network and the stakeholders (Wenger et al, 2003:124). Building on shared understanding of all the participants is one of the main steps to be taken in the creation and development of a knowledge network.

A general level of commitment to the change process has to be achieved in an organisation to motivate stakeholders. Commitment could have been achieved in this case if the ICT coaches had knowledge of the vision and strategy of the university. When leaders communicate and discuss this vision with the stakeholders that are affected by the change, it enhances understanding the need to change. In this case there was no or little dialogue and communication between the people that led the change and the network members at the beginning of the process. Therefore the ICT coaches may have assessed the situation differently from the objectives of senior management and the NMG. Kotter and Schlesinger (1979) identified four main reasons why people resist change. These reasons include: 1) a desire not to lose something of value, 2) the change and its implications can be misunderstood, 3) people can believe that the change does not make sense for the organisation, and 4) a low tolerance for change. Another reason for resisting the change might have been misunderstanding of the real purpose. The real objectives of the ICT network were not revealed to the coaches. In none of the interviews did the coaches refer to the maturity levels from the training plan. Different assessment of the situation (for example the way some coaches reacted on the kick off meeting or the way they perceived their job as ICT coach) therefore might have caused resistance by some of the coaches. Coaches perceived that Senior Management had no idea what the coaches were doing and that Senior Management was not fully informed about the implementation of ICT in education. Some coaches complained that what they knew about the strategy of the university was retrieved from media outside the university. This lack of general knowledge about the objectives of the change might have caused different views about the real objectives of the network and their job.



Uncertainty about the assignment may cause a low tolerance for change. People also resist change because they fear they will not be able to develop the new skills and behaviour that will be required of them (Kotter and Schlesinger, 1979:108). The coaches did not have knowledge of the assignment and their job profile. In this respect Ramsden (1998:127) refers to multi-level operation. That is the need to coordinate all the different layers in the organisation - from Executive Board, Faculty Management, to NMG, ICT coaches and teachers - to have the same picture of the outcomes of the initial change. However universities are so complex that managing change requires more than just coordinating different layers. Because of their balkanised structure (Hargreaves, 1994) faculties and institutes are strongly isolated from each other and people can become attached to their own sub-communities. In the perception of the ICT coaches, the leadership in this change of ICT in education was not clear. There was no central vision and the change was left in the hands of Senior Management of the faculties and institutes.

#### **8.4.3. Theme 2: Identifying change agents**

In this case the results of the individual interviews show that in many cases the wrong people were chosen to act as change agents. The discussion in this section will draw on the findings with the aim to identify key factors to be considered in appointing agents of change as members of a network of ICT coaches.

Finding people that had already worked in the domain was one of the missions of the NMG at the time they wrote the profile of the ICT coach. However this job profile had a rather broad perspective of the competences required. No general selection process was started and no announcements were made that people could apply for the job. Staff members were asked to undertake the job. The findings showed that the knowledge of the coaches in the use of ICT varied considerably. Ideally coaches were asked to carry forward the vision of the Executive Board and build support for the change. In that case the coaches could have had an 'adapter' role to translate the vision into practical actions to implement ICT in education (Caldwell, 2001: 47). No coaches were identified as 'thought leaders' (Wenger 2002: 78), people that define cutting-

edge issues in the domain. Most coaches were asked because of their knowledge of computers in general and for many other reasons, rather than their knowledge of how to enhance the pedagogical use of ICT and learning. In the interviews the majority of the coaches said that they had a more technical approach. Therefore most coaches took the role of helpdesk, application manager, technical supporter of the teachers. Analysis of the interviews showed that not all coaches had the right expertise to bring about the pedagogical use of ICT in teaching and learning. Some coaches just had experience in helping teachers work with computers, not from a pedagogical view of how to use ICT in education but only to explain how computers worked. A few coaches were asked to play this role because they had some pedagogical experience in the use of ICT in education; however new standards to work pedagogically with ICT in learning were not discussed between the NMG and the coaches.

The results of the baseline survey showed that coaches were sceptical about their mission to convince teachers to use ICT in their teaching practice. The analysis of the interviews made it clear that the majority of the coaches translated this mission in training the teachers just the instrumental use of the applications. Although they were teachers, the majority of the coaches did not have much experience yet with learning and ICT. The motivation of coaches was diverse; some coaches said that it was not a popular job because of the resistance of the teachers they had to train.

If an organisation decides to create a network to bring about the exchange of knowledge and the development of ICT in learning, it is important to find people that will meet the requirements of the network. In this case four key factors were important in finding the right people to act as change agents: 1) knowledge of the domain, 2) finding people with the same passion and vision about the topic, 3) define clear assignments and targets, 4) form a strong guiding coalition.

First, to bring about change it is necessary to find people who have knowledge of the domain. Wenger et al (2002:78) refers to people that are well respected practitioners in the domain, in this case knowledge about ICT and

education. Wenger et al (ibid, p. 79) suggest interviewing potential members in order to discover which ideas those people have about the domain and to identify hot topics around which community members can be linked. However Caldwell (2001: 45) argues that the role of change agent has to be given to directors or senior executives who can envision, lead or implement changes. In this case the NMG could have discussed this beforehand with Faculty Management to find the right people. However Faculty Management pushed the majority of the coaches forward and in many cases the NMG was presented with a *fait accompli*.

A second key factor is finding people with the same passion and vision about the topic. When changing an organisation Toffler (1985:14) argues that there must be a coherent alternative embodied in a plan, a model or a vision to change the existing order. But in this case the NMG did not share this vision or plan with the most important actors, the ICT coaches. Not every coach had knowledge of the domain. They had different backgrounds, experiences and motivation. An important criterion to help communities grow and develop is to focus on aspects that members are passionate about (Wenger et al, 2002: 75).

The third key factor in finding people to act as change agents is the definition of a clear assignment and targets. The NMG said they missed a well-defined assignment about where to go with the ICT coach network. Managers need to communicate if they act as change agents, offer leadership, and motivate (Hayes, 2002: 19). Wenger et al (2002: 90) argue that management support is critical in the first stages of the community. Faculty Management needs to understand the role and legitimize the participation of the coaches in the network. It has to define the goals and objectives by giving clear assignments and targets to the people that implement the change. Hayes (2002: 15) identifies the importance of a benchmark of standards to measure targets and achievements. He also stresses the need to take account of the purpose and desired outcomes within in specified time frame. The main target that the NMG had in mind was to transform the curriculum in which ICT was fully integrated. However most coaches in this study were not aware of targets

that had to be achieved. One coach in faculty B mentioned a project plan but the other coaches in this faculty said they did not know what their target or specified objective was. The hours per year that coaches from all faculties said they had available varied in a wide range from 40 to 360 hours a year or were, in two cases, not specified at all.

The fourth key factor is bringing together a team of change agents with characteristics such as position power, expertise, credibility and leadership (Kotter, 1996:57). This is what Kotter defines as 'the guiding coalition'. Dawson et al (2010:73) state that Kotter's model may be particularly useful in guiding the work of faculty developers in their role as change agents because, in this case, coaches do not need to be managers to lead change. They could have been the guiding coalition. But who was the guiding coalition in this case? The NMG did not have the power to find the right people for the job because they were dependent on Senior Management. The coaches did not see the NMG as the leading team and this resulted in two faculties (A and B) working without the NMG because they judged their own expertise as more qualified. The coaches had no power and support to do their job the way they wanted. The majority said that time pressure and roster problems hindered them in doing the job of ICT coach. A guiding coalition must have a good reputation and credibility to set the right example to be taken seriously by other employees. Also it is important to develop good relationships with people in the organisation that are affected by the change. These people should tell the right story, set standards and also set examples (Kouzes and Posner, 1998: 18). However, the coaches in this case had no standard practices to work with ICT in learning, and they were not seen as the guiding coalition. They were teachers like the rest with perhaps more skills to work with computers. Perhaps the ICT coaches were seen as change agents by the NMG group; however, this vision was not discussed between the NMG and Senior Management.

#### **8.4.4. Theme 3: Communicating the change**

When an organisation wants to change to a new way of working, the communication and interaction between the key stakeholders and participants

can determine success or failure. It was found that Faculty Management and the NMG did not communicate the main objectives of the change in the use of education. This section discusses the communication in the ICT coach network about the objectives and domain of the network and the way this communication was perceived by the ICT coaches.

At the very start of the network the NMG invited a list of people who were identified by their faculties and institutes as ICT coaches. In this first meeting the main goal of the NMG was to help the ICT coaches to set up a training course about the new applications and the objectives to change pedagogy. However a majority of the coaches who were present at that meeting felt they were treated like inexperienced teachers. The overall goals and objectives of the network were not communicated to them. Knowledge about ICT and learning was shared in different networks in the university and information about ICT in education was cut up and fragmented into different media. Therefore the coaches did not know where to find the right answers. They tried to find their own way of communication to meet within their faculty using a variety of tools like Skype, Adobe Connect or a private e-learning environment.

The university had a special lecturer role, entitled "Learning with ICT", to research educational innovation and ICT. This lecturer was not involved in the ICT coach network although a few coaches were familiar with her work. There was also an online knowledge network for the whole university about ICT and education. The baseline survey and the interviews with the coaches showed that the teachers and the coaches seldom or never used this knowledge network. Each faculty also had its own intranet. Coaches in the faculties used this intranet or created a specific virtual space to communicate. The NMG had no influence and knowledge of the contents of discussions that were made on these faculty networks. Meetings, workshops, e-mail, one-to-one communication, a variety of virtual networks together seemed to be too much for the coaches.

Two years after the start of the ICT coach network a weblog was created. The main reason was that coaches complained that there were too many e-mail

messages. The NMG created the weblog and tried to use it as an alternative for e-mail messages. However the coaches seldom visited the weblog and did not use it and. Coaches were alerted by e-mail if something important was posted on the blog. Some coaches believed that the weblog was created to force them to visit the virtual environment.

Many writers (Kotter, 1996; Hayes, 2002, Davenport and Prusak, 2000; Brown, 2001, Wenger et al, 2002) have emphasised the importance of communication in change processes. Wenger et al (2002:58) write that communication and relations between community members lie at the heart of a community. This begins with communicating the change vision to community members and stakeholders. The real power of a change vision is when people that are involved have common understanding of its goals and direction (Kotter, 1996: 85). Between sending and receiving the message, a lot can go wrong (Schultz von Thun, 2010: 92), especially when there are barriers in understanding objectives, understanding the use of ICT in pedagogy. For example some coaches had different perceptions of their assignment and therefore the coaches made their own interpretations and 'translations' of how to use ICT in education. Coaches were supposed to spread 'the gospel' about the use of ICT in education. However the medium they used might not have been the right one and may have been perceived in different ways by the receivers of the message. Coaches in faculty D admitted that the way they announced the training to the teachers might not have been the right way because there was low attendance. The NMG used different media to communicate (a weblog, email, intranet) with the coaches, and the coaches in the four faculties also used different media (posters in the teacher room, email, intranet) to communicate the training to the teachers. According to Knecht and Stoelinga (1997:28) using different media may have caused 'selective reach', which means that the information did not reach the right persons. For the NMG this was one reason to set up a weblog and notify the coaches when new messages were posted.

Managers who have a 'need to know' attitude may fail to send the necessary information that might help employees to understand the need for change and

feel more involved in the change process (Hayes, 2002: 115). For example some coaches believed that management and NMG forced them to work as ICT coaches and that the Executive Board accelerated the change too much. The NMG said that they had a vision and that they knew what to do. But this message was not communicated by the NMG. The different roles that the NMG and the coaches had, therefore, could have influenced the common understanding of the messages that were sent from the NMG group to the coaches and vice versa.

Coaches said that there were different practices and cultural differences between faculties and this may have caused communication difficulties and misinterpretation (Wenger et al, 2002:118). Different practices and cultures make communities and identities distinct and therefore communication between those can be problematic (Brown and Duguid, 2001: 202).

Misinterpretation can also occur when people have a different belief about a certain subject. Fishbein and Ajzen (2010: 290) write that beliefs represent the information we have about the world in which we live. They state that those beliefs form the cognitive foundation for many of our responses to aspects of that world, and that a person's attitude is formed by their beliefs about performing a particular behavioural act. Coaches were not told what the main objective of the network was. Most coaches believed that they had to train teachers in the technical use of the applications so most of them just did that.

#### **8.4.5. Theme 4: Building the network**

In section 8.3 it was argued that a community of practice was not built and that the network was not strong. The network was not strong because there was a lack of social relations. The network was formed by two groups of members, the group of ICT coaches and the NMG. In this case the role of moderation and management of the ICT coach network was in the hands of the NMG.

In a community or network members have to get to know each other and developing relationships and sufficient trust is a key factor in the development of a network (Wenger et al, (2002:82). Engagement (Wenger

1998: 74) is an important factor to create a sense of belonging, either in networks or CoPs . Participants meet together, share thoughts and work on a shared domain. Laine (2006) states that status and the need to belong to a social group are important factors to create a sense of belonging. Other important factors are past experience and the need to share this experience and insights. Online socialisation is an important stage where participants are sending and receiving messages and becoming familiar with each other (Salmon (2002:11). Three other factors were important in building this network: the moderation of the network; the organisation of meetings, and the organisation of the virtual environment. These factors will be discussed below.

### The moderation of the network

An important role of the moderator during the maturing stage of a knowledge network is to focus on the overall objective and not only on the sharing of ideas but also organising the knowledge of the network (Wenger et al. 2002:97). The NMG had a change vision. However in the moderation of the network this vision was not communicated. If the ICT coaches had a clear understanding of this change vision they could have acted as an important channel, because they were in a position to exchange views in the organisation, seek feedback and provide clarification to teachers. Moderation is necessary in all stages of the development of a virtual network but especially in the early stages. A network needs a leader. Bittner (1997:6) argues that a leader must be sensitive to the varying needs and interests of members. The moderator must be able to provoke discussion and debates, give encouragement where necessary to keep the group on track (Bittner, Ibid)

In the period of the research, which covered three years, three different moderators managed the virtual network of the coaches and this made relationship building with the coaches difficult. In all faculties the coaches criticised the approach of the NMG during the early stages of the network. The NMG was really motivated to engage in the network but found it hard to get frequent responses from the coaches.



Both face-to-face and online discussions are guided by background documents and knowledgeable moderators and they must be run in the same way (Bittner, 1997:6). However too many environments were used and this made it difficult for the NMG to moderate what was going on in the ICT coach network. The network used face-to-face meetings, a dedicated virtual network space, a weblog, a web based knowledge net, and intranets from the university and the faculties. An important role of the NMG was to enhance communication, not only between the ICT coaches but also between coaches and teachers of the university. Some coaches complained that their role of ICT coach was not always clear because they had different roles in their institutes. If they communicated with other colleagues, it was not always clear whether this was in their role as ICT coach or as application manager or IT coordinator of the institute.

Too little moderation leads to chaos, and too much moderation leads to the speculated police status and eventually members leaving (Laine, 2006:100). In this case the frequency of moderation was very low. The members of NMG stated that time pressure was a major factor in the moderation and development of the community. The virtual environment appeared to be a repository of documents, mainly placed there by the moderators. A discourse about the meaning of these documents was not found. Wenger et al (2002: 103) advocate the use of a community librarian who is able to provide the participants with relevant books and articles and is able to review and select material. In face-to-face meetings such a librarian can also take notes. In this case occasionally minutes of meetings were spread by email. Selections of articles and reviews were not found in the virtual environment of the coaches.

Except from a Code of Conduct no guidelines or instructions were given about the use of the website and the ICT coaches found it hard to find their way. That might have influenced the way the coaches created a sense of belonging in their network, particularly in the early stages.

#### The organisation of the meetings

The travel distance between campuses was a reason for some coaches not to

attend meetings. The university had two main campuses that were located 15 miles apart and the coaches on each campus operated separately. The coaches did not meet together very often. They had meetings within the staff of their own faculty but most of the time they met their colleagues as a teacher or as an application manager, not as an ICT coach. Four or five times a year the NMG organized network meetings as a channel to communicate with each other. Those network meetings had different objectives. The agenda for the meetings led the ICT coaches to choose whether or not to attend. Some meetings were purely to exchange information and knowledge; others were advertised as network meetings but proved to be application training sessions. Most coaches spent their time combining their job as teacher and training their colleagues in the use of ICT and for them attending the meetings was hindered by time pressure and roster problems.

The ICT coaches were not able to create social relations because of the low frequency of their meetings and their low participation in the virtual community. Socialisation is an important component of knowledge creation. In their four modes of knowledge creation Nonaka and Takeuchi (1995:70-73) argue that socialisation is necessary to externalize tacit knowledge as explicit knowledge. Socialisation facilitates the sharing of experiences which makes it possible to have a meaningful dialogue and reflection. According to Salmon (2002:11) socialisation is important to provide bridges between cultural and social environments. As Brown and Adler (2008:18) argue, our understanding of content is socially constructed through conversations about that content and through grounded interactions especially with others around problems or actions. Most of what people know today has been learned by talking things over with other people or working together in shared problem solving (Brown et al 2005). Sharing of knowledge has a strong social character.

Frequent meeting and setting milestones to work on, or events to bring participants together can create better social relations. Participants join and stay when there is “something in it for me”. The NMG did a small survey among the coaches and this survey showed that the coaches wanted to meet more often around a specific issue. They were interested in deeper discussion

about their role as ICT coach and how they could organise their work in such a way that they could profit from it. The solution of the NMG was to offer more diverse meetings with different themes. Those meetings were also offered to staff outside the ICT coach network. By doing this, the network became more fragmented and coaches only met once or twice a year.

The majority of the ICT coaches belonged to the peripheral group and knowledge was hardly shared. Only one or two coaches were active in the network. The frequency of face-to-face meetings was irregular and the character of the meetings was diverse. There were meetings to train the ICT coaches in new applications and there were meetings in which the use of ICT in learning was discussed. Within two faculties there were monthly meetings with teachers who were also ICT coaches. These meetings were not planned as a part of the ICT coach network, but they were normal work sessions about the daily routine. Another opportunity for coaches to meet each other was once a year when a seminar event was organized by the NMG. This seminar about the use of ICT and learning in general was open to all teachers and staff of the university. A majority of the coaches attended at these events but the focus was not on the ICT coach network and because there were many participants outside the network it was difficult to focus on the social relations within the network.

#### The organisation of the virtual environment

Because the members of the network were distributed over different faculties, different working environments and different locations, the NMG tried to enhance discussion and knowledge sharing by establishing a virtual network environment. To enhance sociability the virtual environment had a small 'who-is-who' section. Although the virtual space was meant to be an environment for the coaches in the first place, also others in the university registered. The network consisted of a relatively small group of 31 coaches and 4 members of the NMG, yet in total 75 persons registered for the virtual environment of whom 26 were ICT coaches. Only a few pictures were uploaded in the 'who-is-who' section and no further details about their job, interests and specialisation were added to the profile. Although 26 of the 31

coaches had registered in the virtual environment, the analysis of the virtual community showed that only two coaches and a moderator from NMG were active. That made it hard for the coaches to develop good sociability. A social and healthy network can only survive if the people build and develop knowledge and steward this in the organisation (Preece, 2000: 80). The coaches had different organisational backgrounds, some coaches were team managers in their unit, some were administrators with no teaching practice, some others were IT professionals. Coaches said they felt different ways of working between institutes and different perceptions of working with ICT in education. This could have affected socialisation within the ICT coach network. Different jargon or organisational languages are basic barriers in communication. Schönström (2005: 21) writes that a common language that is used by the members in the network will make the network more efficient. Brown and Duguid (2001: 204) argue that practice can only be embedded in other practice if the practice is the same because communication and coordination breaks down if people talk in different world, different languages. The authors argue that *'to understand where knowledge flows and where it sticks we need to ask where and why practices (and so embedding circumstances) are common, and where and why they are not'*.

The results of the analysis of the virtual environment of the ICT coaches showed that the issue of usability was an important factor. Where sociability focuses on social interaction, usability focuses on human-computer interaction (Preece 2000: 27). An important part of the network of the coaches was formed by the virtual network space where this human-computer interaction was needed. Due to the overwhelming choice of web based information it is paramount that people can find their way in a short time. If they cannot find what they want, they will leave. This happened in the first stage of the development of the virtual environment of the ICT coaches. Bad usability influenced the low participation in the environment. According to Nielsen (2000: 333) usability tests need to be performed with real users and these users should do real tasks. An internal investigation from the NMG among the coaches showed that there were too many complaints about usability. All information was dislocated in the environment and more up to date

information had to be provided. The NMG tried to overcome this by introducing a weblog next to a complete new virtual environment for the coaches. This new environment was meant to replace all other digital forms of communication such as e-mail, newsletters, and weblog. The new website was not tested with the ICT coaches. Although there was not much discussion in the virtual environment of the ICT coaches, analysis of the network showed that 39% of the discussion was about usability. Attendance was low in the virtual network and this was due to the fact that more than a third of the coaches had trouble finding the information they needed. The coaches were expected to participate in the virtual environment and the face-to-face meetings and the NMG communicated with the coaches by e-mail mainly about dates of meetings, and the launch and use of the virtual network. In the first period of establishing the network there was mainly one-way traffic in communication from NMG to coaches. The NMG tried to push and activate the participants by posing some questions in the environment and by giving a code of conduct. In this code rules were given about the frequency of participation, about the support of the moderator, and the level of participation by the coaches. This resulted in a peak of postings in the first three months; however most postings from the first months were copied and pasted from the first website. In the last eight months of the evaluation period only 22% of the messages were posted.

There were three main reasons for the weakness of the network; 1) low attendance and organisation of the meetings and low activity of the coaches in the virtual environment, 2) the weak moderation of the network, and 3) the usability of the virtual environment. This made it very hard for coaches to socialise and to get to know each other and have contact with the NMG. These factors made it difficult to exchange knowledge and to build a relationship and trust in the network.

#### **8.4.6. Theme 5: Creating new knowledge through social interaction**

An important factor in development of a knowledge network is the creation of new knowledge. The reasons why there was so little social interaction to create and share knowledge in this network is discussed in this section.

Hislop (2005) defined the creation and stewarding of new knowledge by means of social interaction as the practice based perspective on knowledge. In his view knowledge is not an entity and can only be given a meaning in a social context. Whereas knowledge management in the first generation or the objectivist perspective focuses on repositories and technological sharing of knowledge, second-generation knowledge management is based on social interaction. When people share their knowledge it requires interaction and informal learning by storytelling, conversation, coaching (Wenger et al, 2002:9). Liebowitz (2007:16) states that there are two main approaches of knowledge management: codification and personalisation. Codification focuses on the storage of knowledge in repositories. The personalisation approach focuses on the connection between people

Although much of knowledge in Otto University was stored in repositories the findings of the interviews show that this knowledge was hardly reused, and when it was reused it had no meaning. The main reason for that was the lack of social interaction between ICT coaches and between ICT coaches and NMG. In this case the main focus was on codification of knowledge in repositories, on the intranets of the diverse faculties and in the virtual network of the coaches. Some tacit knowledge was codified in some form in order to make it easily accessible. However coaches and NMG had different approaches on how to interact face-to-face in order to construct new knowledge. The way the applications were used by the coaches and teachers were hardly discussed between the coaches and if they talked together the main subject was the instrumental use of applications and not the way they were embedded in pedagogical use.

Social relationships to build up trust and credibility in a social network are important to enhance knowledge sharing. Lack of credibility is an important reason why knowledge is not shared in an organization (Szulanski 2003:28). Coleman (1999, in Liebowitz, 1999) argues that trust is perhaps the main motivational factor in sharing knowledge together with the ability to communicate clearly to transfer meaning. Wenger et al (2002:121) state that a large part of trust-building takes place *'in the private space of the*

*community by increasing the connections between individual members'*.

Szulanski (2003) refers to the concept that originated from Aristotle's observation that 'good men' are more influential on people's behaviour. In large networks it is more difficult for people to maintain strong ties with enough people in the network (Hislop, 2005: 244). If the network increases then the network density is likely to decrease.

The ICT coach network was not large (31 coaches). From the average 9 ties the coaches had, 5 were inside the own faculty. The density analysis showed that the network was not strong and social relationships were weak and therefore it was difficult to build up trust. Not only the results of the individual interviews but also the analysis of the density of the ICT coach network showed that coaches were mainly connected with coaches of their own faculty.

Although the coaches preferred face-to-face meetings, they seldom had regular contact. The results of the Focus Group Interviews showed that coaches in faculty D hardly knew each other. Whether people share or do not share their knowledge is also crucially affected by the social and cultural context in which they work (Hislop, 2005: 49). Ardichvilli et al (2003: 65) write that successful knowledge sharing in a community of practice is impossible without the active participation of a substantial proportion of all members. As the data showed in this case, when contributing and sharing knowledge in a virtual environment community, participants may find that their postings may not be important for others (Ardichvilli et al, 2003: 69).

In general intrinsic motivation is seen as the real motivator to share knowledge (Abel et al, 2001). The majority of the coaches acknowledged that knowledge sharing was important, especially in cases where they believed, that good practices were at hand and that it was not very effective to 'reinvent the wheel' in a certain project or training method. On the other hand, they admitted that not much sharing was practised. Most coaches felt the need to share knowledge within the faculty and the reason not to go beyond that and socialise with coaches from other faculties was that the differences between the faculties in their opinion were significant. Even when

academics are working in the same subject they often do not know or understand the work of others but especially this is the case across subject borders (Reponen, 1999:239). Some coaches stated that knowledge sharing was not their task. They believed that their task was to train their colleagues. In a few cases it was noted that coaches shared their training material but the majority believed that their material was not suitable for the context in other institutes and therefore could not be used to enhance ICT in learning for the teachers in that faculty. In the cases where ICT coaches shared their practice it tended to be because the coaches knew each other. Most ICT coaches stated a preference for personal contact instead of e-mail or by means of a virtual environment. In the university so-called 'shop-window-meetings' were organised where teachers from different subjects displayed their practices. When asking the coaches for examples of how knowledge could be shared best in the university several coaches mentioned these kinds of meetings.

Cross et al (2001:117) state that it is important to increase the opportunity for face-to-face contact in knowledge building networks through organising meetings, workshops or seminars. However the coaches in this network did not meet very often because the majority of the coaches perceived that there were too many meetings already in the university. Because coaches did not meet very often, they were not able to discuss their knowledge with the other coaches. In the practice-based perspective, knowledge only gets a meaning if people are able to interact personally with each other. Regular contact, telling stories among each other helps to analyse and diagnose products and then develop understanding about 'how to' work with them. However, the understanding of 'how to' only gets a meaning when this knowledge is shared in collaboration on shared narratives (Brown and Duguid, 2005). The results of the individual interviews and the focus group meetings revealed that the domain of the coaches in the network was mainly focussed on knowledge about the working of the applications that the teachers in the university had to use. The coaches did not discuss what implication this knowledge had for using ICT in learning. This is what Brown and Adler (2008:19) call the social aspect of learning where acquiring knowledge about a subject is just the first part, the learning 'about'. The full participation in the field is learning 'to



be'. That means that people not only learn about the subject by socialising. By discussing and embedding these practices people learn how to improve their skills. The training of the coaches in how to work with the applications can be seen as 'learning about'. Discussing this in the network with coaches from other faculties and thus giving meaning to this knowledge can be seen as 'learning to be'. The learning 'to be' takes place using this knowledge of the daily practice by collaboration between people.

In this case study the interviews with the NMG made it clear that the faculties were disconnected. The coaches were all busy in the primary educational process and for this reason the NMG had trouble to convince coaches to come to the meetings. In the interviews the majority of the coaches preferred face-to-face communication versus virtual communication because of the personal interaction. However, the coaches had hardly any regular contact with each other because, when there was a meeting, different coaches attended the meetings. So the chance that the same coaches would meet each other was small. Meeting regularly is one aspect. Another aspect in knowledge sharing is the context in which this knowledge is shared, either face-to-face or virtual. Coaches had to little knowledge of the context in other faculties and therefore it was difficult to give this knowledge a meaning. Knowledge only gets a meaning when it is transformed to the context where it is needed (Bechky 2011:321), and this transformation needs social interaction (Mateo et al, 2011).

The study revealed that there was very little social interaction either face-to-face or virtual between the coaches. As a result there was hardly any knowledge sharing between coaches about the use of ICT in education. The main reasons for that were:

- Coaches mainly had contact within their own faculty.
- Faculties seemed to be disconnected.
- Emphasis of the coaches was on training colleagues, not on knowledge sharing.
- Knowledge management focussed mainly on codification of knowledge and this knowledge was hardly discussed.

#### **8.4.7 Theme 6: Face-to face versus virtual networking.**

The ICT coaches in this study had a preference for face-to-face contact above virtual contact. In this section the findings that underpin this argument are discussed.

The NMG facilitated the ICT coach network with both face-to-face meetings and the opportunity to work virtually. One of the differences that virtual communities have compared with face to face-communities is the possibility to work asynchronously. Those differences include access, time, mode of expression and virtual cues (Wang and Woo, 2007:273). Dietz and Bishop (2001:272) found that synchronous communication is more dynamic, faster, and more arousing than asynchronous online discussions. For the ICT coaches in this case a synchronous online platform was not offered. They had the choice between asynchronous virtual communication and face-to-face meetings. The results showed that there were several reasons why the ICT coaches did not get involved in online discussion. Lack of time and the feeling of being overloaded with information on different platforms were the most mentioned reasons.

Hayes (2002:116) describes the importance of the channel through which knowledge is shared, and that managers should be aware that in certain circumstances oral communication is preferred above written communication, especially when there is a need to exchange views, give feedback and give opportunity for immediate clarification. When asked, the majority of the coaches named the social aspect of face-to-face meetings as the most important reason to come together, although the frequency with which they actually met was low. Reasons mentioned were the speed in which matters could be clarified, and the possibility to have easier contact later when persons have met face-to-face. In the interviews coaches stated that they would have liked to meet more often but due to roster problems and dislocation they could not find the time to do it. Some coaches argued that not everybody had good writing skills and that face-to-face communication was preferred to clarify things.

Most ICT coaches perceived face-to-face meetings as more interactive. Coaches used e-mail to exchange information mainly one-to-one, but meeting together was preferred. Some younger coaches had a preference for virtual communication compared with the older coaches, the latter finding virtual knowledge exchange a much too impersonal process. One issue that many coaches mentioned was the lack of non-verbal communication. Senju and Johnson (2009:127) found that eye contact enhances our cognitive process when we are in contact with another face. On the other hand the collection of knowledge documents in a virtual environment was said to be an advantage meaning that ideas were not invented at more than one place at the same time.

The NMG blamed the institutes and faculties for not sharing the practice of the classification of the virtual documents in the various repositories and this made it hard for the coaches to find the information they needed. Rhoads (2010: 115) found that inappropriate training or lack of clearly defined goals resulting from the culture of organizations and social habits might cause barriers to efficient use of computer applications. In this case the ICT coaches were not introduced to the virtual environment; neither were they trained to use the platform. The large number of documents was a barrier for some coaches to use the virtual environment because the information was too overwhelming. Almost a quarter of the ICT coaches said that the structure of the virtual environment was confusing. Structure in websites is one of the most important factors for a good use (Nielsen, 2000: 10). Better usability of the environment could have helped the coaches to find the information they needed. What impact did either online communication or face-to-face communication have on the social development the ICT coach network? Did working face-to-face influence the way the coaches socialised? As far as one can speak of 'usability' of face-to-face meetings the importance of a good structure of network meetings seems essential. Wegner et al (2002: 58) argue that the heart of a network is the web of relationships. Face-to-face communication has the advantage that meaning can better be transformed in a physical environment. However in this case the meetings did not seem to be successful.

#### **8.4.8. Theme 7: Changing behaviour**

According to Baskin and Aronoff (1979: 178-179) knowledge alone does not necessarily lead to favourable attitudes. People that have knowledge of a certain subject will not automatically have a positive opinion. Van der Schaaf et al (2008) argue that beliefs that guide teacher behaviour are context related and exist predominantly as tacit knowledge and therefore cannot easily be articulated. This case showed that the tacit knowledge of the coaches about ICT and learning was not discussed between the coaches. The knowledge and information that the ICT coaches in this case had was based on their working experience in the faculties and institutes.

The ICT coaches were oriented towards an instrumental use of ICT in education. Too little emphasis was laid on the pedagogical use of ICT in education, that is the use of ICT in such a way that ICT becomes an integrated part of the curriculum. The main reasons for this were the beliefs of ICT coaches, the expectations they had of their job, and their participation in the network. The basis of this argument is discussed in this section in relation to theorists in the field of knowledge, attitude and behaviour.

The knowledge that ICT coaches had about teachers and faculties, about e-learning and about the use of ICT was questioned in this study in relation to their attitude and behaviour. Beliefs about the motivation of teachers, the usefulness of knowledge sharing between faculties, and use of e-learning by themselves and teachers may have influenced the expectations that the coaches had of their participation in the network, and, as described in section 8.3.2, may have caused resistance. In the interviews in this study ICT coaches, of whom the majority were also teachers, were asked how teachers were motivated to use the ICT applications. The perception of the coaches about the motivation of the teachers, and their knowledge about ICT and learning can be seen as important background factors that formed their beliefs about the usefulness of knowledge sharing and knowledge creation in the ICT coach network. They said they had been asked to undertake this job for various reasons but these reasons were mainly focussed on their past behaviour as teachers with more than average knowledge about the instrumental working

of computers. Their beliefs were formed by their knowledge of computers, perhaps by their age or gender or the culture of the institute or faculty. They believed that the knowledge of other faculties was not useful for them.

Most coaches had doubts about the pedagogical use of ICT in education. The majority believed that teachers were motivated to use e-learning applications but their ability to work with ICT in a pedagogical way was not high. Most coaches believed that it was essential first to train the teachers from a technical perspective how to work with an e-learning application. In their technical orientation the coaches believed that their role was to help their colleagues to work with the new applications.

Therefore knowledge sharing about the pedagogical role that ICT in learning could have had no priority for most coaches. This attitude was not what the NMG had in mind. They focused too much on maturity levels of Itzkan (1994), the network part and knowledge

exchange, and too little on the basic steps that had to be taken to achieve change. These different views between the stakeholders caused resistance to the change. Other reasons that affected less positive attitudes towards ICT and learning were the poor usability of some applications and the fact that there were not enough coaches to do the job. Coaches were not consulted and therefore they had the feeling that that the e-learning strategy was too much top down oriented.

The attitude of the coaches was partly formed by their knowledge or perception of the assignment and by their beliefs about experience. The baseline survey showed that coaches, who were expected to motivate their colleagues, were sceptical about the motivation of these colleagues. They were also critical about the network itself and had the feeling that there was top-down pressure on the teachers to use ICT in education. This influenced the way the coaches perceived the kick off meeting of the network. About 25% of the coaches mentioned this moment. The NMG wanted the coaches to have a role of pioneer to convince the teachers of the pedagogical use of ICT in education, but instead of that they taught the ICT coaches how to set up

training. This influenced the coaches' attitude towards the use and strength of the network. At that moment the NMG seemed to have jumped too far. The coaches were in need of technical and basic information and the support from the NMG to start the job as change agent.

Coaches operated from the belief that was based on their own knowledge and on their working environment in the faculty or institute. Their perception of the motivation of the teachers with whom they worked influenced their own perspective. The coaches had various meanings about their work. Some operated from a pedagogical perspective, most of them from a technical perspective, others acted as just a 'help desk'. The fact that the coaches did not share those meanings resulted in 'islands' and the belief that there were too many diverse applications to manage the learning. A few coaches therefore believed that all applications should be integrated into one system. Apart from that, their belief about the support of the management played an important role in their attitude. The context of the ICT coaches was the same as the colleagues they had to train. So in fact most coaches acted as technical guides to teach their colleagues the use of ICT application. However the NMG wanted the coaches to transform the learning from just substitution to transformation where ICT was fully integrated in the curriculum.

A range of beliefs and motivational factors affect why people in organisations are not willing to share knowledge. For example, they may not be convinced of the usefulness of new knowledge; there could be a difficult relation between recipient and the source; or the knowledge source does not have the motivation to share knowledge (Szulanski (2003: 27-31). Half of the coaches said that they were not motivated to share knowledge between the faculties and visit meetings because there was, in their belief, too little interest from other colleagues. They perceived the training as very technical so there was hardly any time to chat and exchange ideas.

The reason not to share knowledge with other faculties could also be related to the usefulness of knowledge. The most mentioned reason why coaches had no contact with other faculties was their belief that the way of working in faculties was too different, although they could not give examples to support

that view. The NMG argued that one of the reasons why coaches did not come to meetings was that coaches had a limited view of their own institute and said that their work was different from that of other institutes. NMG believed that there was not a knowledge sharing culture in the faculties and Senior Management supported the coaches but mainly to train and help the teachers of their own institute or faculty.

Heavy workload and lack of time emerged as the most hindering factors to participation in the ICT coach network. 18 of the 31 coaches stated this explicitly. These coaches believed that the number of hours that ICT coaches were given to do the job was insufficient and left no time to attend meetings or participate in the virtual environment. In faculty A coaches said that 20% of their time was allowed to spend on administrative activities and professional development and this left no time for extra ICT coach activities. In most cases the coaches were willing to work as ICT coach and develop knowledge in ICT and learning but when these activities interfered with their teaching duties, they said they had no choice but to follow their roster.

### **8.5. Closing remarks**

This chapter has analysed why the ICT coach network was not functioning as a community of practice. The ICT coach network was not a very strong network, and did not contribute much to the main objective of the university, the aim to enhance the use of ICT in education. What happened in the network was analysed in a research model with seven themes. A model of knowledge-attitude and behaviour to change pedagogy with the use of ICT will be discussed in the next chapter.

# CHAPTER 9

## Discussion

### 9.1. Introduction

In the previous chapter, three major research questions were explored: 1) Did the ICT coach network function as a community of practice or a network? 2) What happened in the ICT coach network? 3) Why did the ICT coach network not function effectively as a community of practice or a network?

After analysing the data it was concluded that not much knowledge sharing happened in the network. There was some individual knowledge sharing between coaches; however in general there was too little activity in the network of coaches and no new knowledge about ICT in education was created and shared. Therefore the original research question was rephrased:

*What factors facilitate and hinder the development of knowledge networks in the development of ICT use and teaching in an organisation?*

As the emphasis is now placed on factors that hinder and facilitate the development of knowledge in the use of ICT in education, the aim of this chapter is to identify and discuss those factors. In the light of this, the chapter does three things. First the factors that hinder the development of a knowledge network are discussed. Secondly, in order to explore the factors that facilitate the development of knowledge networks in the use of ICT, a model is developed of the process of pedagogical change in relation to the use of ICT. In this model the strong relation between knowledge, attitude and behaviour is discussed as an on-going process. Finally in this chapter the preconditions that facilitate the development of knowledge networks are explored.

### 9.2. Factors hindering the development of the network.

Seven themes emerged during the analysis of the data, which are displayed in Chapter 8 (figure 21 page 201). These themes all deal with the process of the



ICT coach network, its routines and immediate tasks. Reflecting upon the original objectives of the university and the Network Managing Group (NMG) one of the main aims was to create a network in order to share knowledge about the use of ICT in learning. The knowledge that the ICT coaches would create and share was to be used in training which would be organised for the teachers. Objectives of the training were described by the NMG as 'developing teachers' awareness', 'developing a constructive attitude', and developing a pedagogical use of ICT in the teaching practice of the teachers. In the original document of the training (Project Plan Training Education and ICT, Otto University, 2005) it was stated that the university aimed to increase the maturity levels of the teachers based on the model of *Phases of change* by Itzkan (1994; see chapter 2).

Taking the seven themes identified in the previous chapter the main finding of this study is that three important factors have hindered the development of the network: 1) there was a lack of a common understanding among the ICT coaches with regard to the aims and objectives of the management about the change of ICT in education; 2) coaches were appointed with different backgrounds and varying experience of ICT in education; and 3) coaches mainly focussed on the instrumental use of ICT in education while the NMG's expectations centred around the pedagogical use of ICT.

These three factors were regarded as important in the development of a network for the change of ICT in education. The other themes such as socialisation, face-to-face networks and virtual networking can apply to other networks in general. The last of these seven themes (in the model in figure 21) *Changing Behaviour* will be discussed in section 9.3. of this chapter. Reflecting on the analysis of the data a fourth factor emerged: 4) the loosely coupled organisational structure of the university hindered a shared approach in the way coaches were appointed, how the change vision was adopted by the coaches, and the general approach of the training programme.

*Factor 1.* Although the process was well defined in advance in a structured document in which the NMG planned learning objectives, training material, and assignments (Otto University document, 2006), the strategic vision of the

management was not communicated clearly. Therefore the ICT coaches and teachers in the university were not aware of the overall mission of management.

This study has revealed that the structure and organisation of the university hindered the communication of the change vision of management. The different cultures and structures of the faculties and institutes in universities make it necessary to adopt strategies that fit such particular environments. Hargreaves (1994: 213) found that what teachers know and believe in one department or division can be quite different from what they know believe in another. A university specialist often does not know or understand the work of other specialists (Reponen, 1999: 239). The coaches perceived different cultures of management and teaching styles among the faculties and institutes. This reflects the background of Otto University which was established in 1996 after a merger of about 20 smaller institutes of higher education in two different cities. The ICT coaches felt that there were cultural differences in subjects and thus in approaches to teaching; for example one of the coaches stated, *“I have heard their stories but they have no meaning to me”* (Coach D9).

*Factor 2.* The findings of this case study show that coaches were appointed with different backgrounds and varying experience of ICT in education. One of the findings of the interviews and group interviews was that the majority of the coaches did not believe in the mission of the NMG. One of the reasons for the different recruitment of the coaches was also related to the organisational structure of the university. Although Hargreaves (1994:213-15) talks about repositories of self-interest and teacher subcultures in schools, the results of interviews made it clear that in Otto University balkanisation existed. The study showed that there was poor communication between coaches of faculties and institutes. Moreover coaches perceived that faculties had their own approach with regard to the participation of coaches in the network and the professional development of teachers. In addition many coaches stated their concerns that teachers were not yet ready to change and that in general there was too much pressure, not enough time and a lack of

motivation among teachers. The coaches also pointed out that by the time teachers had adjusted to working with a new application Faculty Management would introduce another new application.

*Factor 3.* The findings in this case study identified that most ICT coaches were motivated to work with computers because they were familiar with the technology. However according to Shephard (2004:70-71) teachers also have to go through many developmental stages such as engagement with a range of possibilities that e-learning provides, understanding the pedagogical models to be used and embedding this within learning programmes. The ultimate aim of the change strategy was that teachers would change their behaviour to embed ICT as a structural pedagogical part of their teaching practice.

The approach in the institution studied in this case study might perhaps have been more oriented towards separate faculties and institutes and the use of a more blended leadership. Blended leadership is an approach that combines specific elements of 'traditional' hierarchical leadership with more contemporary aspects of 'distributed' leadership (Collinson and Collinson, 2009). Instead of a 'top down' delegation model in universities Collinson and Collinson found that a 'bottom-up' engagement was preferred by employees to enhance team-working and employee commitment. In the institution studied in this case study in each faculty or institute change agency might have been better embodied in combined teams in which people with instrumental and technical abilities and curriculum developers worked together to change the behaviour in the use of ICT in learning.

*Factor 4.* HE institutions are generally not well suited to top-down leadership and leadership in universities is widely distributed (Bolden, 2009:257). The management of faculties and institutes could not have adopted the vision of the Executive Board in this case because of their 'loosely coupled' structure (Weick 1976). This resulted, in some cases of the appointment of ICT coaches, in choosing people for the job with different knowledge and experience in the domain. McNay (1995: 105-6) defines four models of university change that are based on the degree of 'tightness' of 'looseness'. Two of these models have a tight structure: the Corporate university and the Enterprise university. In

the Corporate model the focus is on loyalty to the organisation and to senior management, and management uses performance indicators and benchmarking as a means of control. In the Enterprise model the management style comprises devolved leadership with a strong focus on the outside world. The two loose models are: the Collegium model and the Bureaucracy model. The Collegium model focuses on freedom and personal goals, not affected by external control, while in the Bureaucratic model power lies with the senior administrators and the university is led by rules and standards. McNay (1995) argues that all universities draw on some components of each type. One of the findings that emerged from the data was that Otto University had characteristics of a Collegium model where a passive and permissive approach was taken in the structure and establishment of the ICT coach network. In the collegium model people have a lot of 'freedom' (Land, 2001: 7). In this case study the autonomy and authority to develop the network was given to the individual coaches. In a more Corporate model senior management are more likely to determine the policy and approach, and the training courses and structure. The training given to the ICT coaches would then have been similar if not the same for all teachers, for all institutes and for all faculties. However in this case study every faculty followed its own rules.

### **9.3. Changing pedagogy with the use of ICT**

Before discussing the preconditions that facilitate a knowledge network it is important to consider in more detail knowledge as an important component of such a knowledge network, and the relation of knowledge with attitude and behaviour. To emphasise the importance of knowledge as a component in the change of behaviour in this specific case, a new model of knowledge-attitude and behaviour has been developed (figure 22). The model is based on the models of changing behaviour by Fazio (1986), Petty and Cacioppo (1986) and Fishbein and Ajzen, (1986; 2010) which were explored in Chapter 3. The word '*knowledge*' is only used in the model of Petty and Cacioppo (1986) in relation to use knowledge for the evaluation of one's attitude. As people acquire more knowledge they will be more able to analyse relevant information on certain topics (Petty and Cacioppo, 1986:131). In the graphical reproduction of the models of Fishbein and Ajzen (2010) and the MODE model of Fazio (1986) the

word knowledge is not used, although in the description of both models knowledge is referred to as being necessary to evaluate a persons' attitude of an object. Therefore a model was developed (figure 22) in which *knowledge* is depicted as a key determinant of attitudes and behaviour. In relation to the underlying case three concepts of Knowledge are distinguished in the model: 1) Prior Knowledge, 2) Practice Based Knowledge and 3) Social Network Knowledge. The component of attitude is divided into negative or positive attitudes that determine an individual's evaluation of the change process. The last component, Behaviour, distinguishes between the instrumental or pedagogical use of ICT in education. Positive or negative evaluation will determine the behaviour of change agents in the use of ICT in education.

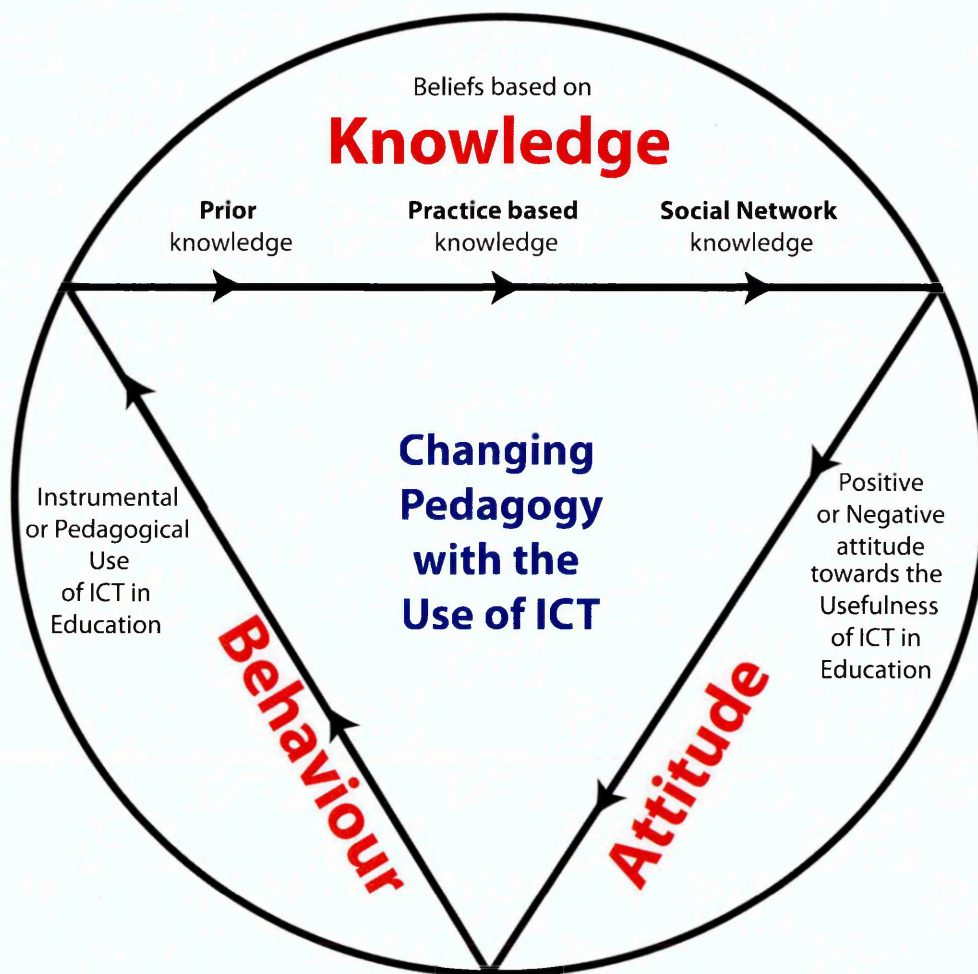


Figure 24: Changing Pedagogy with the use of ICT, Schimmel, 2013

The basic argument of this model is that teachers have beliefs about the use of ICT in education based on their prior knowledge. On this prior knowledge they build new knowledge from their experiences of using ICT in their teaching. This practice-based knowledge can be discussed in a social network. The discourse in such a network may lead to a favourable or unfavourable attitude towards the use of ICT in education and which may, in turn, lead to instrumental or pedagogical use of ICT (the behaviour). The beliefs that teachers have can be based on one or more knowledge components. An important argument of this model is that it is based on social constructivism and the practice-based perspective of knowledge as described in the main research Model (figure 21) on page 201.

In practice the evaluation process of knowledge-attitude-behaviour will not be as linear as it is depicted in the model. In the model in figure 22 the construction of knowledge, attitude and behaviour can be seen as an on-going process. Beliefs based on knowledge are constantly evaluated and activate an attitude that may lead to the intention to perform new types of behaviour.

This behaviour is internalized in the knowledge of people as learning by doing (Nonako and Takeuchi, 1995:71) and this knowledge provides the basis for their new beliefs about the usefulness of ICT in education. This new knowledge becomes prior knowledge. In a social network of teachers this knowledge is again discussed and evaluated and may lead to a more instrumental or a more pedagogical use of ICT. The components of this model will now be discussed.

### **9.3.1. Behavioural use of ICT in education**

Universities that want to change the behaviour of teachers in the use ICT have to deal with barriers that teachers may have to using ICT in their teaching (Bosley et al, 2005; Adeoson, 2010; Ten Brummelhuis, 1995; Afshari et al, 2009). Barriers can be lack of technical support, poor Internet connectivity, resistance to change, limited ICT infrastructure, and insufficient knowledge about how to use ICT in a pedagogical way. The findings of this case show that different perceptions about objectives and different knowledge also might lead to certain behaviour in the use of ICT in education.

The evaluation of the use of ICT in education may lead to a favourable or positive attitude, to a negative or unfavourable attitude or even to a neutral attitude. An unfavourable attitude can be the result of other factors that have a negative influence, for example lack of time, roster problems to attend training, lack of perceived usefulness of an ICT application, or the fact that too many applications are introduced at the same time. Marcinkiewicz and Regstad (1996) found that the opinions of colleagues were important factors that influenced teachers whether or not to use ICT in education. Weistra (2005: 65) argues that the use of ICT in education more and more is not a free choice of teaching staff but is forced by the university, the pressure of colleagues and by the students who expect teachers to use ICT in their curriculum.

Shared expectations, beliefs about the behaviour and actions of others can build a relationship of mutual understanding (Roberts, 2000:436). In 2008 only half of the teacher educators in the Netherlands used ICT regularly in their courses (Drent and Meelissen, 2008: 188) and these teachers used ICT mainly to prepare lessons and for administration purposes. A study in Wageningen University (Mahdizadeh et al, 2008:152) in the Netherlands revealed that at this university more attention has been paid to the instrumental use of e-learning than to the pedagogical use. Teachers in this university believed that ICT had added value for teaching and learning but they needed to learn how to use it in their own courses.

The perception of the ICT coaches in this case study was that most teachers used ICT in an instrumental way. Based on the knowledge coaches had and their attitude most coaches mainly trained their colleagues to use ICT in an instrumental way. This behaviour also influenced the motivation of the coaches to share knowledge about the pedagogical use of ICT because they were not convinced of the usefulness and because they thought there was too little interest from other colleagues. Their attitude towards the use of ICT influenced their way of training. It also influenced their participation in the network of the ICT coaches. To stimulate a pedagogical use of ICT it is necessary that all people that are involved in the change process discuss their

beliefs based on their knowledge. This makes it possible to determine what their attitude is towards an instrumental or pedagogical use in order to *'regain or retain their initial attitude'* (Petty and Cacioppo, 1986).

Drent et al (2008: 197) argue that teacher educators who use ICT innovatively in their learning process, and have a regular contact with colleagues and experts in the field of ICT, develop their own knowledge because they have experienced the advantages of the innovative ICT use in their own teaching. The profile of such a teacher educator shows that they have ICT competence that complies with their pedagogical approach, which can be described as student-oriented. The role of teachers has changed (de Laat, 2006; Koper, 2000, Peters, 2000) from instructor and transmitter of knowledge to mentor, facilitator and counsellor. The knowledge teachers have of their own teaching subject is still important; however in their teaching practice they need more competence of the pedagogical use of ICT (Teurlings and Uerz, 2009). This changing practice can be the starting point of the development of new behaviour. For example if teachers experience that students more and more communicate with social media and make more use of digital applications, they might be forced to adjust their professional behaviour. They do this by questioning the existing practice and analysing the contradictions before developing new routines and new behaviour (Engeström, 2000: 968). A favourable attitude towards the use of ICT in education, may lead to a stronger intention to use ICT in education, because *'behavioural beliefs are assumed to determine people's attitude toward personally performing the behaviour'* (Fishbein and Ajzen, 2010:21). The evaluation of attitudes towards the usefulness of ICT in education is discussed in the next sub-section.

### **9.3.2. Understanding the usefulness of ICT in education**

The second stage in the model in figure 22 depicts the positive or negative attitude of the usefulness of ICT in education. The result of the evaluation of knowledge leads to a positive or negative attitude, which results in a certain behaviour. Teachers evaluate their beliefs which are based on their prior knowledge and new knowledge. The case study of Otto University identified that coaches had their own beliefs and that the coaches identified and



interpreted certain beliefs among the teachers in the university. Most of the coaches were also teachers and some of them gave preference to their role as teacher. All people involved in the process of change of education with ICT should discuss their beliefs about the use of ICT and evaluate their attitudes towards the use of it. This will be discussed in the next sub-section.

Davis (1993) developed the Technology Acceptance Model (TAM) that is specifically meant to explain computer usage behaviour. The model addresses why people reject or accept information technology and explains the influence of system design features on the perceived usefulness and the perceived ease of use of ICT. The model is based on the principles of the attitude paradigm of Fishbein and Ajzen (1975). According to the model the perceived usefulness and the perceived ease of use are decisive and form people's attitude towards the actual use of ICT. In a process of change of education with ICT, the perceptions of stakeholders in universities may influence the way they use ICT in their own practice and the way they discuss this with their colleagues. Conole (2002:14) suggests that because of a lack of ICT skills in staff and students, as well as resistance, the use of ICT in education is still fairly low, and even nowadays the ease of use and usefulness of ICT is seen as a key predictor of the actual use of ICT (Mahdizadeh et al, 2008:152). According to Fazio et al (1986) direct experience and beliefs are strong predictors of behaviour, and Player-Coro (2012:104) states that teachers who use ICT in their daily teaching practice will have positive attitudes about using ICT in education. In this case study the coaches perceived that a significant number of teachers were not interested and that in all faculties there was resistance against the use of the new ICT applications.

The research of Ten Brummelhuis et al (2010:19) on the use of ICT facilities in Dutch higher educational institutes showed that there was lack of ownership and entrepreneurial attitude of staff to explore and incorporate ICT in education; however in general there was a positive attitude to use ICT for educational and administrative purposes. In recent research among staff in higher education in Australia (Bate, 2010) it was found that staff in education

believed that pedagogical use of ICT was necessary to engage students in active meaning making; however the way they used ICT was generally limited to presentation-style teaching, completion of worksheets using productivity software and the use of the Internet for simple inquiries. Bingimlas (2009) found that staff in universities have a desire to use ICT in education but lack confidence and competence, and lack access to resources. The attitude of (top) management has great influence in the promotion of the use of ICT (Abdoel, 2010:34). This study did not carry out research with Senior Management; however the support of management to use ICT in Otto University was understood by the ICT coaches as being in terms of facilitating issues such as time, flexibility of roster and ensuring the infrastructure of the ICT systems.

In the model in figure 22, and in the models of Petty and Cacioppo (1986), Fazio (1986) and Fishbein and Ajzen (1975, 2005, 2010), attitudes to the use of ICT in education derive from the knowledge people have. The attitude that people have towards an object is based on the evaluation of prior knowledge, the initial attitude and the quality of the argument (Petty and Cacioppo, 1986). The attitude of people towards an object is based on the subjective norm of the social group to which they belong or based on the behaviour that is seen in others (Fishbein and Ajzen, 1975). If teachers do not see the need to use ICT in their teaching practice they are unlikely to adopt the use of ICT (Cox et al, 2000). Recent research in the Netherlands (Kreijns et al, 2013) revealed that attitudes, subjective norms, and self-efficacy are important predictors of teachers' intentions for the pedagogical use of digital learning materials. Bandura (1991:257) defined self-efficacy as '*people's beliefs about their capabilities to exercise control over their own level of functioning and over events that affect their lives*'. In relation to the use of ICT, self-efficacy concerns teachers' belief about their own capabilities to use ICT in their teaching practice. Cox et al (2000) found that previous use of ICT was a predictor of self-efficacy and that past behaviour is a good predictor to perform the same behaviour in future. The study of Muntaz (2006) made clear that the extent to which teachers judge their own capabilities influences their attitude to use ICT in education. Kreijns et al, 2013:222) also found that

previous use of digital learning materials and perceived knowledge and skills had an impact on attitude and whether or not to use ICT.

The model in figure 22 suggests that the understanding of the use of ICT in education is formed by evaluation of the domain of knowledge and results in a positive or negative attitude towards the usefulness of ICT in education. This attitude results in intended or actual behaviour in the use of ICT. In 1997 a report was published, known as the Dearing Report (1997, cited in Hudson 2009:52) about the change of higher education in the UK. In this report it was recommended that there must be fundamental changes in attitudes towards teaching and the development of a management strategy and an ICT strategy. Change of attitudes in itself is only important if these attitudes lead to a positive change of behaviour towards the use of ICT in education.

In this sub-section I have identified that there are many factors that can influence a positive or negative attitude towards the use of ICT. Universities that want to change pedagogy with the use of ICT have to be aware that these attitudes are based on the domain of knowledge that teachers have. This domain of knowledge is described in the next sub-section.

### **9.3.3. Internalisation of practice-based knowledge**

Double-loop learning is a reflection of how we think, the cognitive rules for reasoning to design and implement our actions (Argyris, 1991:100). How we think is a result of our knowledge. We can have favourable or unfavourable thoughts (Petty and Cacioppo, 1986) or have normative beliefs (Fishbein and Ajzen, 2010). The starting point of our attitude is what we know and how we evaluate this knowledge. In the model in figure 22 the component of knowledge is a result the social construction in a network based on prior knowledge and practice-based knowledge. The three concepts, 1) prior knowledge, 2) practice-based knowledge, and 3) social network knowledge are discussed in this sub-section.

#### Prior knowledge

Prior knowledge can be seen as a combination of people's pre-existing attitudes, experiences and knowledge (Kujawa & Huske, 1995). Based on this

prior knowledge people construct their own understanding and beliefs, rather than acting as passive receivers of knowledge (Driver and Easley, 1978). Constructivists such as Bruner (1960, 1966) and Vygotsky (1978), have recognized the importance of prior knowledge. In his concept of the 'zone of proximal development' Vygotsky argues that learners 'scaffold' knowledge to construct new knowledge based on prior knowledge. Prior knowledge can originate from different resources such as personal experiences, education, through media such as TV, Internet and newspapers, and interaction with family and friends (Fishbein and Ajzen 2010:20). Research shows that the credibility of sources from which new knowledge is derived is evaluated on the basis of prior knowledge (Hovland and Weiss, 1951, cited in Petty and Cacioppo, 1986:156).

Polanyi (1966) made a distinction between tacit knowledge and explicit knowledge. Tacit knowledge is personal and context specific and hard to formalize. It can be seen as the prior knowledge and personal beliefs that people have. According to Polanyi this knowledge is created through involvement in objects, self-involvement and commitment. So in the model in of change in the use of ICT in education (figure 22), the prior knowledge is seen as what Nonaka and Takeuchi (1995: 61) describe as 'knowledge of experience'. Prior knowledge exists on the level of perception, focus of attention, procedural skills, modes of reasoning, discourse practices, and beliefs about knowledge (Roschelle, 1995). When educational technologists, ICT coaches and senior managers are active in a process of pedagogical change of education with ICT, they should recognize the beliefs and perceptions of stakeholders that are involved in that change. This is necessary because people who are involved in the change of ICT in education have their own perceptions, experiences and beliefs about how and to what extent ICT is useful in education.

Based on prior knowledge people construct their beliefs and if people have thought about an issue many times, it may be more difficult to motivate them to think in another way about the same topic (Petty and Cacioppo 1986:148). According to Fishbein and Ajzen (2010) beliefs are formed by a person's

individual and social background and environment. People's social background develops values to prefer certain matters above others and norms are standards for these values within a group or category of people (Hofstede, 2002).

The way teachers use technology pedagogically and not only instrumentally, depends on the beliefs they have (Ertmer, 2005). Teo et al (2008:164) refer to beliefs as '*preferred ways of teaching*'. Pajares (1992:311) argues that it is important to understand the relation between knowledge and beliefs together with teacher behaviour and student outcomes. The findings in this case showed that the ICT coaches had perceptions about how teachers preferred to use ICT in their teaching practice. Coaches stated that most teachers used ICT as a substitute for their traditional teaching practice. In recent research (Entwistle et al 2010; Chai et al, 2009; Meirink et al, 2009) it was found that these preferred ways of teaching can be classified into two dimensions: 1) knowledge transmission or teacher-centred beliefs and 2) knowledge construction or learner-centred beliefs (Entwistle et al 2010; Chai et al, 2009; Meirink et al, 2009). Teo et al (2008) suggest that *teacher-centred beliefs* are based on instruction and teachers that prefer this way of teaching are less willing to use ICT in their teaching (Teo et al, 2008:164). In the university of Wageningen in the Netherlands it was found that teachers use ICT mainly for communication (e-mail), presentation (Powerpoint), management (presenting course material, course calendar and announcements), and that constructivist tools like video conferencing, chatting and online discussions were less used (Mahdizadeh et al, 2008:151). Teachers with learner-centred or *constructivist beliefs* (Brooks, 2002) are willing to use technology as a way to guide students towards becoming independent learners (Tubin, 2006). Apart from teachers' preferred ways of teaching there are other factors that have influence on the use of ICT in education. The ease of use of ICT, the perceived difficulty of certain ICT applications, and time play a critical role in the added value of ICT in the perception of university teachers (Mahdizadeh et al, 2008; Collis et al, 2001; Selim, 2003; Schimmel, 2007)

If universities, as in this case, want to change education with ICT then the beliefs of stakeholders may influence their attitudes to a new way of working. These include beliefs about the usefulness of ICT in education in general, beliefs about specific use in teachers' own field of knowledge, beliefs about different cultures in faculties of institutes (as was found in this case), or beliefs about instrumental or pedagogical use of ICT. To change beliefs and perceptions, in order to influence future performance of the pedagogical use of ICT, it is necessary to engage stakeholders in a reasoned discussion of their beliefs (Fishbein and Ajzen, 2005:28; Shurville et al, 2009: 217).

ICT coaches and teachers will evaluate their prior knowledge about the change of pedagogy with ICT and use this knowledge in the teaching practice. Their prior knowledge, together with their experience in the teaching practice will become practice-based knowledge.

### Practice Based Knowledge

In the practice-based perspective of knowledge (Hislop, 2005) knowledge is inseparable from practice and refers to a purposeful human activity. If change agents do not believe in the change of ICT in education this might be a result of their prior knowledge. However the practice-based perspective of knowledge assumes that this knowledge about ICT in education develops if people are involved in activities and gain new experience.

Brown and Duguid (2001: 201) argue that the acquisition of knowledge is dependent on which milieu people work in, and that practice can only be embedded in other practice if the domain of knowledge is the same. Combining prior knowledge with new knowledge can only be done through discussion between stakeholders (Ibid). This case study suggests that universities that want to change education with ICT need to know what the current practice in their university is and discuss these practices in order to integrate these practices within the organisation.

In a recent report Browne and Beetham (2010) raise a question as to whether educational technologists should navigate between innovation and change and established practices. People with different roles in educational change can

see a situation differently even though they are working towards the same goal (Hannon, 2008). This case study shows that if universities are putting of educational change with ICT in the hands of people with specific experience about that domain that these experiences and beliefs will be varied. The coaches perceived different practices between faculties and different practices between teachers in the same faculty. Also the NMG had a different perspective from that of the coaches.

Knowledge and practice go hand in hand. This means that change agents should engage with people in the field and thus develop common codes of practice as a benchmark and a framework in the organisation (Ellaway et al. 2006). Lave and Wenger (1991) describe this type of activity as legitimate peripheral participation. Newcomers in the field of ICT and education and experienced practitioners discuss, negotiate and renegotiate the meaning of the domain of knowledge. This is necessary because in many cases pedagogy in departments is inherited practice and much of that practice is tacit and relatively unexamined (Browne and Beetham, 2009:28). Discussing these practices together might help to evaluate the original assumptions of the university towards the use of ICT in education. Facilitating discussions in networks enables the construction of personal meaning as well as shaping mutual understanding (Garrison and Anderson, 2003:68).

The findings in chapter 8 show that the coaches had different assumptions about the implementation of ICT in education and perceived different practices in the use of ICT in education. In the professional development of staff in universities it has been found that if people expose themselves to teaching courses and share experiences they are generally more willing to adjust their attitudes, values and practices (Trowler and Cooper, 2002: 235). Therefore universities should embed innovation and change into the current practice by bringing stakeholders together in courses and a practice-based discussion about where to move to in the change of education and the use of ICT. According to Simons and Bolhuis (2004) collaborative learning is advocated but is not practised very much because too often people reflect to their prior knowledge instead of making connections between their prior and

new knowledge. By doing this, knowledge is developed through a process of socialisation. This is the third concept of knowledge: social network knowledge.

### Social Network Knowledge

In the model in figure 22 the term social network knowledge is used to explain what happens in a network of people who are brought together round the same knowledge domain. People bring in their prior knowledge, they bring in their practice-based perspective and discuss the knowledge they have with others in the network. Section 8.4.4 explained the importance of communication in the process of change in a university. So if universities are changing education with ICT, socialisation is an important factor. Only through active interaction can those involved be aware of the meaning that people attach to the situation they are in (Hartley, 1993:25) and if this information is taken out of context it does not have a meaning (Brown, 2002: 53; Brown and Adler, 2008). Connecting prior knowledge and practice-based knowledge through a process of interaction, socialisation and discussing the meaning of this knowledge leads to new knowledge, the knowledge of a social network.

Today social networks are often associated with Web 2.0 tools such as Facebook and LinkedIn. However social networks are more than that. Merchant (2012:6) sees a social network as a pattern of everyday practices of social interaction between friends, family, co-workers, in neighbourhoods and communities. The network of the ICT coaches in Otto University can be seen as an intentional network (Seufert et al, 1999) because it was set up from scratch by the NMG. As discussed in the previous chapter the network was weak for a number of reasons. Trowler et al (2003:11) discuss the quality of social groups in a process of change. They suggest that the ways people respond to innovations are related to their beliefs and that these beliefs can be changed in building social capital, that is connecting with others that are engaged in similar tasks. In changing education with ICT teachers, educational technologists, senior management should discuss the meaning of the use of ICT in order to create new knowledge.



Changing beliefs appears to be a precondition for innovation, and innovation cannot be seen in isolation from teachers' beliefs and practices (Trowler et al, 2003). These beliefs and practices can be discussed in a knowledge network in order to understand the change of pedagogy with ICT.

#### **9.4. Preconditions for a knowledge network to change pedagogy with ICT**

As discussed in the previous chapter change agents must have knowledge of the domain and share a passion with others. Change agents in the use of ICT in education must be capable of blending pedagogical and technical information in such a way that it supports the functional design of e-learning environments (ten Brummelhuis et al, 2010). Participation in a knowledge network can help change agents to cross boundaries in the development of knowledge about the domain (Wenger et al, 2002). Change agents in the use of ICT are seen as knowledge workers who participate in networks to bridge the gap between technology and pedagogy (Weert, 2006:218).

In section 3.6 of this thesis the characteristics of (knowledge) networks were defined. As a result of the analysis of the findings in chapter 8, three important preconditions for the development of a knowledge network to change education with ICT have been identified:

1. The development of a domain of knowledge as a fundamental basis for the change process.
2. Teachers as key role players in the network
3. Strong leadership to manage and lead the change.

##### **9.4.1. A domain of knowledge**

In the previous chapter and in the previous section of this chapter it was argued that the development of the knowledge domain in the use of ICT in education is a precondition of such a network. The change of education with ICT begins with defining the knowledge domain and the parameters of the field, and agreement about the shared interests, focus, approach and projects of the people who participate in the knowledge network (Czerniewicz (2008:177). This case showed that it is important for universities to determine

how ICT in education should be used, and to discuss the ‘instrumental use’ and the ‘pedagogical use’ of ICT.

Prior tacit knowledge that people have, in this case about ICT in education, and the way this knowledge is converted into a domain of knowledge is described as ‘the knowledge spiral’ by Nonaka and Takeuchi (1995: 61-73). To manage this knowledge Wenger (2004:2) developed his ‘doughnut-model’ of knowledge management where practice-based knowledge is stewarded into the organisation (see figure 9). There are elements in the model in figure 22 that have some resemblance with the Doughnut model in that the development of a domain of knowledge is an on-going process if this knowledge is shared and discussed. This new knowledge is stewarded, evaluated, and used. Stakeholders in the change of pedagogy with ICT learn from this new knowledge, internalize this knowledge as a part of their prior knowledge.

Discussion with and between stakeholders is needed about the usefulness of ICT, the preferred ways of teaching and the way technology is used, and shared as a domain of knowledge. It is therefore suggested that the knowledge domain of the ICT use in education should focus on the way teachers prefer to use ICT in their teaching practice and whether they will use ICT in a teacher-centered way or in a constructivist approach, the learner-centered way.

Discussing the domain of knowledge about pedagogy in ICT is a constructivist way of learning. In the interviews many coaches talked about the way they trained the teachers in the use of ICT; it showed that not much discussion took place. They were instructors and transmitters of knowledge and most of them had the role they were used to in their teacher-student relation. When changing pedagogy through the use of ICT, the main objective for universities is to involve the key players in the discussion about the domain of knowledge.

#### **9.4.2. Teachers as key players in the network**

After identifying the main issues of the knowledge domain for the use of ICT and learning it is necessary to define the participants in such a network. As

described in the previous chapter, participants in a knowledge network not only should have a shared interest but they should also bring their prior knowledge and practice-based knowledge into the domain. Such a knowledge network can be defined as a number of people, resources and relationships that enable accumulation and use of knowledge by means of knowledge creation and transfer processes, for the purpose of creating value (Seufert et al 1999:184). Teachers are the key role players in teaching practice because they are directly involved in the education of the students. Some educational technologists are also teachers (as in this case study) and senior management may also have teaching experience. However the focus in the development of a domain of knowledge about ICT and learning should be on teachers. In the development of a knowledge network to change pedagogy with ICT it is important that, if ICT coaches are used for the professional development of teachers, in the first place people are chosen with teaching experience who are able to recognize the impact the use of ICT in education has on the pedagogy of the curriculum. Besides such ICT coaches, the network could be extended with more teachers. Teachers play an important role in the teaching paradigm shift because they must understand the role of technology (Afshari et al, 2009). Barker (1999:4) argues that an educational paradigm shift is moving from instructivist philosophies of teaching and learning to constructivist principles. Lave and Wenger (1991: 51) refer to constructivist principles as negotiation and renegotiation of meaning. Hislop (1995) calls this the practice-based perspective of knowledge. Such a 'practice-based network' is essential for knowledge sharing in organisations and needs to be supported or even mandated by senior management (Büchel and Raub 2002:589).

Practice-based knowledge about ICT is the result of prior knowledge and the experience to work with ICT. However this practice-based knowledge about the usefulness of ICT can be evaluated more deeply when it is discussed in a social network with the purpose of exchanging and creating new knowledge about this subject. In such a network Phelps et al (2012: 1119) identified three types of knowledge related outcomes: Knowledge Creation, Knowledge Transfer and Knowledge Adoption (see also chapter 3). Knowledge Creation

refers to the generation of new knowledge; Knowledge Transfer refers to the efforts of a source to share information and knowledge with a receiver and a receiver's efforts to learn it; and Knowledge Adoption is the way new knowledge will be used by the teachers, the way their knowledge is *internalized* as learned by doing (Nonaka and Takeuchi, 1995:71). So if the objective for universities is to change education with ICT then it is important for the users to gain knowledge about the pedagogical use of ICT. Most change programs are dealing with new ways of working and it takes time for people to adjust to these new ways of working. Following the strategy of Itzkan (1994) and Rieber & Welliver (1989) to substitute, transit and transform learning with the use of ICT as discussed in chapter 2, it is concluded in this thesis that knowledge adoption is the ultimate goal. Adoption of new knowledge is the ability of teachers to use or implement the knowledge into new practice.

#### **9.4.3. Strong leadership to manage and lead change**

Chapter 8 discussed how ICT coaches perceived leadership and management support. An important precondition for the successful engagement of teachers in the use of ICT in education is the support of senior management and addressing organisational and financial implications (Bosley et al, 2003: 8). Especially middle managers play a key role in the stewarding of new knowledge into the organisation. According to Nonaka and Takeuchi (1995: 49) it is necessary to involve top management, middle management and front-line workers in what they call '*middle-up-down*' management. Sharing, discussing and stewarding innovative practices into the university calls for administrative and management support to facilitate the right conditions in the development of education with ICT (Fullan, 1985). Collis et al (1994) advocate the guidance of a project leadership team in networks for professional development of educational practices with ICT. In their recent research on the development of Technology Enhanced Learning (TEL) in the UK, Browne et al (2008) found that lack of strategy and leadership was a barrier. Furthermore the lack of time and the lack of staff knowledge in the use of ICT were ranked as the top two barriers for the development of TEL in the universities. Senior management plays an important role in the facilitation of staff to develop new skills. In recent research Dawson, Britnell, and Hitchcock (2010, cited in

Dawson et al, 2010) found that change management was a critical competency of teaching directors to be able to lead the change in universities. However change management models of the business world are not always applicable to universities (Reponen, 1999). In universities there is a danger that knowledge is too fragmented and also decision-making is decentralized and fragmented (Ibid). That makes it more necessary that senior managers advocate and support the need for educational change with ICT. Kotter (1996), Wenger (1998) and Hayes (2002) have emphasized the importance of leadership support and underline the necessity of managers to lead and communicate the change. According to Karakhanyan (2011:18) leaders and policymakers in universities should learn about the context of the change to help them to design change policies and thereby promote the implementation of the change. Senior managers need to understand the knowledge in the domain of the use of ICT and learning. In section 9.2.1 we have seen that the components of a knowledge network are paramount for the sharing and development of new knowledge and that domain knowledge of all people (including senior management) involved in the innovation of education with ICT is crucial. It is the starting point for change.

#### **9.4 Closing remarks**

Although it was stated in this chapter that the process of knowledge-attitude-behaviour is an on-going process, knowledge is the basic component from which attitude and behaviour follow. A change model of the use of ICT in Education (figure 22) was used to answer the rephrased research question and discuss the preconditions that facilitate development of knowledge networks in the development of ICT use and teaching. The development of such networks in the use of ICT in education in universities can be hindered by the absence of a clear vision from senior management. The development can also be hindered by the teacher-centred pedagogical beliefs of participants, which can result in mainly instrumental use of ICT in education.

To change the more teacher-centred beliefs of participants in a knowledge network it is necessary to strengthen the domain of knowledge. Prior knowledge and practice-based knowledge should be discussed and negotiated

between participants in order to develop a domain of knowledge that makes it possible to develop positive attitudes to the usefulness of ICT in education. These positive attitudes could lead to the adoption of new knowledge, the internalisation of the knowledge domain about ICT in education. If it is aimed that teachers make more use of Information and Communication Technology in their teaching practice it is important that they are involved in this knowledge adoption process.

In the next chapter the key findings of the research, and the implications these findings have for practice and for future research are summarised.

# CHAPTER 10

## Conclusions

### 10.1 Introduction

This chapter encompasses a summary and an overall discussion of the results of the study and recommendations for future research. First, a reflection is made on the whole case study as a piece of research. Next the key findings of the overall case study and the main themes that guided these findings are presented. A statement is made how and why the themes emerging from this study will contribute to knowledge in the field of knowledge management and change management. Finally it is considered how these themes will lead into implications for practice and further research.

### 10.2 Reflection

In the first year of this PhD case study I used my thirty-five years of working experience in a commercial business environment to enter the academic world of teaching and learning. I had the belief that practical knowledge management implications would be the same in any organisation, no matter what field of practice this organisation is working in. What I learned however was that universities differ a lot and that the core business of universities is the sharing and creation of knowledge. However the organisational structure of universities and the diverse culture of faculties and institutes make it difficult to create a knowledge sharing practice between staff.

The use of a mixed method approach made it possible for me to gather data when I was in the university (the interviews and focus group interviews) and to research at a distance (the base line survey, the social network analysis and the analysis of the virtual network). However, the study might have been enhanced in a number of ways. First, order to define the research problem and to write a research proposal I undertook preliminary interviews with four staff members who were directly involved in projects about ICT and learning. The main study entirely focussed on the ICT coaches and none of the senior managers was interviewed. With hindsight, it would have been better to

explore a broader scope of the university by also interviewing senior management. The study would have been improved if members of the Network Managing Group and Senior Management were interviewed shortly after the first analysis and if preliminary results and conclusions were discussed. Secondly, the number of coaches during the study increased and this would have made it possible to interview new coaches about their perceptions as well, but time was a constraining factor to do so.

### **10.3 Key findings of this case study**

At the start of this research it was assumed that the ICT coach network in this case was an interesting face-to-face and virtual network through which could be explored the way in which such networks develop. The study aimed to explore whether and how members of this network would learn from each other. The main research question was: *“What is the role of face to face and virtual networking in relation to creating and sharing knowledge for the development of ICT use in teaching?”* The main objective at the start of the ICT coach network was to set up a network in which ICT coaches were supposed to share and create knowledge about the use of ICT in education. What was found was that not much of this happened. The question was then asked why was this the case and what hindering factors caused the non-development of the network.

Looking more specifically at the additional question research question, *How does the knowledge and practice of the ICT coach develop in face-to-face or virtual networks with regard to the use of ICT in teaching?*, one of the key findings was that perhaps knowledge between one or two coaches in different faculties developed with regard to the use of ICT in teaching, but in general no new knowledge about this subject was created and shared in the period of this case study. After three years the conclusion was that the practice of the ICT coaches mainly focussed on instrumental knowledge of the ICT applications that were used in the university rather than on pedagogical change.

It was found that the absence of leadership and management support played an important role. The main objective of the Network Managing Group was to



professionalise the teachers by means of ICT coaches. The ICT coaches were brought into this network to create and share knowledge between the institutes and faculties. However there was no general understanding between Senior Management and the Network Managing Group. One of the key significant factors was that the management did not play a leading role and that the people that were asked to manage the network had little or no influence on the recruitment of ICT coaches. With one or two exceptions the coaches got little or no support from Faculty Management. Most coaches operated independently within their institute.

Changing towards the more pedagogical use of ICT in education and communicating this change to the coaches and the teachers was found to be difficult. For the coaches it was not clear where to find the right information about the pedagogical use of ICT and about the practice of the ICT network because the university used too many channels to communicate. Coaches complained that knowledge was spread over so many digital networks and intranets, and that communication was received from different senders. The NMG tried to canalise all information by starting a weblog in which they informed coaches about new issues that were placed in the virtual community. However the weblog was not known to all coaches and important messages about the network were missed. Because the majority of the coaches did not visit the virtual community very often the frequency of the communication between NMG and coaches was low.

Looking at the role of the ICT coaches, it was found that many teachers had a different perspective of the role of the ICT coaches. In many cases teachers approached coaches in their role as decentralised application managers. This role was very demanding for the coaches who had this double role: an application manager focused more on the instrumental use of an application and as a liaison between the system builders and the users. Yet the coaches were asked to focus on the pedagogical use in the first place. It was hard for some coaches to determine which role to play. The NMG wanted to professionalise the pedagogical way the teachers used ICT in their curriculum; however most ICT coaches in the university were mainly technically oriented.

They coaches wanted support from the helpdesk, and support and training in the technical use of the diverse applications. In the perception of the ICT coaches, at the time of the research, the teachers in the university were not motivated yet to make the necessary steps to use ICT in a more pedagogical way. There was no clarity about what targets or objectives the ICT coaches should achieve. Each institute and faculty seemed to have its own policy although the ICT coaches said that they did not to know this policy. The NMG acknowledged that the purpose of the ICT coach network originally was to professionalise the teachers in the university to use ICT in education in a pedagogical way and to give an impulse for the renewing of education. They had the feeling that most ICT coaches were '*not the right person in the right place*' at that time. They tried to convince Faculty Management about the qualifications that an ICT coach should have but in their belief faculties gave preference to the fulfilment of the daily teaching practice and the completion of the roster.

Although the ICT coach network was established to share and create good practices in the use of ICT in education, the findings of this case study were that hardly any knowledge was shared. The main reason was that the coaches seldom had contact with other coaches about the domain in the network. They met three or four times a year during the training sessions or during workshops. Coaches only met on a regular basis within their own faculty. A few discussions were started in the virtual environment of the coaches but the tacit knowledge of the coaches about ICT and learning was not discussed between the coaches. Furthermore, the coaches perceived that the practice between faculties and institutes differed too much. The virtual environment turned out to be a repository with documents, which is a more objectivist perspective of knowledge management. A practice-based perspective of knowledge management would have required an online discussion about the meaning of these documents and about the use of ICT in education in general.

In the ICT coach network the coaches could either work face-to-face or virtually. The majority of the coaches said they had a preference for face-to-face meetings although the frequency of such meetings was low. The virtual

environment was hardly used by the coaches. Because there were too many virtual spaces the coaches lost their way in communication. Another reason for not participating in the discussions was the time pressure that was perceived by the coaches.

The knowledge that ICT coaches had about teachers and faculties, about e-learning, about the use of ICT, and beliefs about the motivation of teachers, the usefulness of knowledge sharing between faculties, and use of e-learning by themselves and teachers may have influenced the expectations that the coaches had of their participation in the network. With their attitude towards knowledge sharing in the network, it was difficult to develop a vivid and lively community of practice about the use of ICT in education. It is my general conclusion that the ICT coach network was not a knowledge sharing community.

#### **10.4 Key issues about the change of pedagogy with ICT**

Considering the main findings of this specific case in relation to key theorists and recent literature, the following key issues emerged:

*Changing beliefs.* One the major issues in any change process is to motivate stakeholders about the valued outcomes of the change. People that are involved in the change are likely to support change if they expect to profit from it in terms of more satisfaction, more success, better working conditions, challenge, status or improvement of knowledge and skills (Hayes, 2002). In changing pedagogy with ICT, change agents need to focus on the beliefs of the teachers about the usefulness of ICT. One of the key findings was that there is a strong relation between the beliefs of teachers and the attitudes they have. Based on the theory of Planned Behaviour (Fishbein and Ajzen, 1975, 2010) a model of knowledge-attitude-behaviour was developed (figure 22). The starting point in this model is the knowledge, and especially prior knowledge and practice-based knowledge to change teachers' beliefs. Recent theory (Entwistle et al 2010:6; Chai et al, 2009; Meirink et al, 2009) has showed that the focus in the change of pedagogy should be on the change from teacher-centred beliefs to learner-centred beliefs. That means that teachers have to change the way they teach students and change from

knowledge transmission to knowledge construction. Valued outcomes have to be discussed between learning technologists and teachers concerning how ICT can help to construct new knowledge.

*Developing a knowledge domain.* Discussing beliefs, experiences, and best practices about the change of pedagogy with ICT is found to be a major condition to create a shared knowledge domain. This can only be done in an environment, either face-to-face or virtual, where teachers and learning technologists can construct this knowledge domain in a social way. By doing this the knowledge about the domain will be embedded in practice, embedded in the culture, and knowing and doing will be inseparable (Hislop, 2005: 27). Discussing beliefs about the valued outcomes is also necessary to incorporate Technology Enhanced Learning and knowledge management initiatives in universities (Shurville et al, 2009).

*Developing blended leadership.* Denning (2005) argues that a principle task of leaders in organizations is to create consensus about the main objectives of the organisation and how to achieve them. Considering the loosely coupled structure of universities (Weick, 1976), it was found that senior management plays an important role in the transformation of education to a more pedagogical use of ICT. Management needs to develop appropriate human resources for professional staff in the transformation of education (Shurville et al, 2009), and combine a top-down strategic mission with the acknowledgement of bottom-up initiatives from learning technologists and teachers (Collinson and Collinson, 2009). Senior management also plays an important role as a sponsor of knowledge management initiatives. Managers and supervisors need to engage in a knowledge network about the domain to understand its role and importance for the transformation of education (Wenger et al, 2002).

## **10.5 Implications for practice**

Knowledge sharing, change and implementation of ICT in Education are the main subjects of this thesis. In the beginning of this process it is important that senior management operates on two levels (Osland et al, 2001: 80). First stewarding the vision to the people they lead and knowing what impact this

can have on others. Second it is important that senior management sense a personal purpose and commitment to the organisation's larger mission, in order to make it, as Senge (1990: 352) argues, a possession, a personal vision.

This case demonstrates the importance of knowledge networks to create and share knowledge about the use of ICT in education. When coaches in institutes of higher education are assigned to train their colleagues in order to professionalise them in the use of ICT, it is necessary that these best practices are shared and that they are measured. However before coaches start their job it is necessary that not only they know what to do but also that the teachers in the university know what is expected of them. To support change by stakeholders Strebels (1996: 87) identified three major dimensions in the compact between management and staff. The formal dimension is that teachers know what their particular job is and that this is captured in job descriptions, employment contracts, formalized assignments etc. The second dimension is psychological and this is mainly implicit. It is the mutual expectation and reciprocal commitment between teachers and managers. It is about the personal commitment of the teachers, based on the beliefs that managers recognise their contribution to the change. The third dimension is the social aspect. Here teachers ask themselves the question 'what is in it for me?' and they evaluate the balance between financial and non-financial aspects.

Building and moderating a knowledge network about ICT and Education needs a dedicated manager or project team whose main objective is to leverage knowledge into tangible benefits for the organisation (Bonner, 2000:37). The most important task is to locate knowledge and best practices in ICT and learning and organise people in the organisation to capture, distribute and create that specific knowledge. According to Earl and Scott (1999:30) in most organisations, where knowledge management is developed, management is responsible for the articulation of the purpose and nature of knowledge management as an important resource.

A practice based knowledge network about ICT in Education means that the knowledge has to be created and shared in an open social environment, not

just by putting readers, course plans, project plans and PowerPoint presentations in the virtual repositories but by discussing the themes, ideas and innovations together. As Brown (2002: 54) writes, knowledge is information that *“has been internalized and integrated into our frameworks”*. Management’s task is to encourage participants in the network to share and discuss the information they have, and by giving meaning to this information. By telling each other stories about the best practices of ICT in Education the knowledge can be embedded into practice. The moderators’ task is to develop a sense of social presence in the knowledge network. Social presence is defined as the ability of participants in a network to project themselves, socially and emotionally, as real people through a medium of communication (Garrison and Anderson, 2003:28). The real challenge of a university knowledge network about ICT and Education is to steward their shared meaning and practice into the organisation. Transforming their knowledge to meet the objectives of the change and innovation of education, and keeping the network vivid by renewal of practice and looking for successors that can keep the knowledge network going.

The period over which this case was researched lasted three and a half years and only gave insight of what was happening at that time in that specific university. On the one hand the establishment of this ICT coach network aimed to professionalise teachers in the university to a more pedagogical use of ICT in education; on the other hand it aimed to develop a knowledge sharing community for the coaches. Changing universities has been shown to be difficult (Fullan 2001, 2002; Ramsden 1998; Garrison and Anderson, 2003) and, although the findings refer to this particular case study and therefore any generalisations must be made with the greatest care, some implications for establishing a knowledge network in order to change ICT in learning can be drawn which may be useful for universities in general.

The main factors that universities needs to consider in the professional development of teachers in the use of ICT and learning are as follows:

- Define the objectives for professional development in the use of ICT and learning.

- Create a strategic plan and framework for professional development about ICT and Education.
- Find the right change agents to implement the change with the use of ICT in learning.
- Create a balance between the ambitions of the university in the use of ICT and learning and the availability of ICT materials and the ICT competences of the teachers.
- Create understanding between educational technologists and academics to develop ICT applications that contribute to the demands of the teachers and students.
- Assess the teaching staff in the use of ICT and learning and discuss steps for improvement.
- Develop a climate where knowledge sharing is a part of the organisational culture.
- Stimulate constant evaluation of the development of the practice of ICT in learning to innovate the way of working between teachers and students
- Establish an open knowledge network for teachers, learning technologist and managers and embed the moderation of such a network in the daily practice of a group of moderators from each faculty.

## **10.6 Contribution to knowledge**

Knowledge creation and knowledge sharing among professionals is widely described in the literature. In most cases this is done from the perspective of a commercial company or other business environment. There is relatively little literature on knowledge management in educational institutions. It was hoped in this study to contribute to the understanding of knowledge management within educational institutions and the role of face-to-face and virtual networks as tools of knowledge sharing and knowledge creation with regard to the use of ICT among professionals in education in the Netherlands. However the case study showed that not much discourse and knowledge sharing either face-to-face or virtual was taking place about educational change between the ICT coaches. What the research actually has unpacked is

how difficult change is in universities and how carefully it needs to be managed and what the key variables are that need to be addressed.

This case study makes three specific contributions to knowledge:

First a contribution is made in relation to the use of research methodologies. A combination of a positivistic and constructivist approach was used: a particular combination of a survey, a Social Network Analysis together with interviews and group interviews designed for the particular research problem that the study addressed. In this way it was aimed to contribute to a better understanding of the use of mixed research methods in the field of research about ICT and learning.

Second a contribution is made to the theory of knowledge, attitude and behaviour. In combining models of the theories of Fazio (1990, 1986), Petty and Cacioppo (1986) and Fishbein and Ajzen and Madden (1975, 2010) the research contributes to understanding of the implications for the use of prior knowledge and beliefs of teachers and change agents in the development in ICT and learning.

Third, much international research has been done about the use and implementation of ICT in learning in higher education. In the Netherlands research has been done about the implementation of ICT in education (Weistra 2005, van Weert 2002; de Laat, 2006; Drent and Meelissen, 2007; ten Brummelhuis et al, 2010,) but no research was found about the use of ICT coaches to change the use of ICT in education. No knowledge sharing practice was found about educational innovation among teachers in the Netherlands. The study gives practical implications for the building of a knowledge network in an educational organisation. Seven themes were found and discussed about educational change and implementation of ICT in universities

## **10.7 Implications for future research**

In this thesis the role of face-to-face and virtual networking in relation to creating and sharing knowledge was researched. In this first decade of the 21<sup>st</sup> century Information and Communications Technology has become a part of our lives. Walking on the street, on campus, in the university we see people



using smart phones, tablet computers and other electronic devices all the time. Bull (2010) calls this the “Always Connected Generation”. The way people build their social network nowadays is connecting with ‘friends’ through all kinds of social media. What implications would this have on the curriculum of education and the way teachers will connect with students? How is knowledge shared in universities with the fast development of ICT? Turkle (2011: 17) writes “*technology reshapes the landscape of our emotional lives, but is it offering us the lives we lead?*” Always-Connected but Alone-Together? If we want to know something we don’t ask questions to our friends, we pick our smart phone, laptop or desktop computer and we search Google. The best ‘hits’ on the Internet give us instant information. It is necessary to understand to how this information will turn into knowledge if the meaning of this information is not shared and discussed. It was Andrew Keen (2007: 29) who stated that we control the information age. The consumer is also the knowledge creator. In some universities in the Netherlands staff share knowledge and information by sending tweets on Yammer ([www.yammer.com](http://www.yammer.com)), by blogging and discussing in forums on the Internet. Most of these resources are nowadays accessible with mobile devices at any time and any place. To understand what the role of these developments is on the use of ICT in education we need to research how teachers use these developments in their daily teaching practice. We also need more research on the use of knowledge networks in higher education. This case study has given insight in the development of initiatives of professional development of teachers in one university. To get more insight in how teachers are trained in the use of ICT in education it is necessary to do more research about the professional development of teachers in the use of ICT and learning in relation with knowledge sharing initiatives.

Research (Ardichville et al, 2003, 2006; Bechky, 2003; Brown and Duguid, 2000, 2001; Buchberger et al, 2005; Hislop, 2005; Skog, 2005) has shown that that people develop knowledge in a social environment, and there is enough evidence (Tiene, 2000; Meyer, 2003; Rhoads, 2010; Lee, 2011) that face-to-face communication enables knowledge sharing, communication and trust and that it can improve group cohesion. However there is also evidence (Bourhis

et al, 2005; Dubé et al, 2006; Laine, 2006; Gannon and Fontainha, 2007) that virtual environments can enhance learning, stimulate discourse and create a sense of belonging. In a few years the generation of students and workers that are born in the 21<sup>st</sup> century will enter the schools and universities or are becoming the new employees in organisations. This will open new ways of working, new ways of communication. The implications of this on the use of ICT in education have to be explored.

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# APPENDICES

## Appendix 1: Individual Interview questions for ICT coaches

### Introductory comments

- A brief introduction of myself
- A brief overview of the research (purpose, current state, short overview of questionnaire)
- Ask permission to record the interview on audiotape
- Promise to keep the results anonymous (ethics)
- Start the interview/ start recording!

### *Current Job / experience*

- Can I first ask you what your current job in the university is?
- How long do you work in education?
- Can you give a short overview of your experiences?
- How did you become an ICT coach?
- What was the reason that you applied for it?
- Why do you think you were asked for it?
- How you do judge your own skills and knowledge on computers?
- Are you more technical oriented or pedagogical?

### Network

- The first training of the ICT coaches focus on the use of the new e-learning environment Scholar. How much interest is there among the teachers to use Scholar? Why do you think that?
- Do you have insight in the development of ICT in education in other faculties? Can you tell me what you know about that? If yes, How do you know that? If no, do you have contact with other colleagues in the other faculties?
- How much support do you get as ICT coach?

- How were you introduced to the network?
- What is in your opinion the main role of the ICT coach network?
- Did you get an assignment or target as individual coach or as a group? If not, what is the reason for that? If yes, do you think that it is realistic?

### **Face-to-face**

How often do you meet as a group?

- What do you think from this frequency?
- How often do you like to meet?
- What should be the purpose of the meetings?
- Are you satisfied with the content of the meeting?
- Are you satisfied with the attendance of you colleagues?

### **Virtual community**

- How often do you visit the e-place for the ICT coaches?
- What is the main reason for this?
- How were you introduced to this web space?
- Can you easily find your way around?

### **Weblog**

- In December a weblog was set up in addition to the web space. What is your opinion about that? Do you use blogs yourself?
- Have you ever put a comment or a document to this blog?

### **Knowledge Sharing/ Knowledge Creation**

- Do the ICT coaches have a shared vision how ICT should be used in education at the university?
- What is the best way to share your knowledge with the other colleagues? What way do you prefer best?
- How did you develop your knowledge on ICT in general and on ICT in education in particular?

- What is your opinion of the <name knowledge web> How often do you visit it? Have you ever published something? Why?
- Will the new build e-place of the NMG play a role in the knowledge creation of the ICT coaches? What is needed for that?

### Network Analysis

I will show you a matrix here. Can you tick the boxes of the ICT coaches and the extend of which you share knowledge or have contact with them about the ICT coach network?

-----

Is there anything that you would like to add to this conversation?

Thank you very much for you cooperation!

(Switch off- recorder!)



## Appendix 2: Coding scheme for first analysis of interviews

1. Profession
2. Experience
3. Assignment ICT-coach
4. Appointment ICT-coach
5. ICT-skills/experience
6. Teacher motivation
7. Management support
8. Management vision
9. Knowledge of Faculties
10. Knowledge of university's - vision
11. Knowledge of Higher Education
12. ICT-coach network - virtual
13. ICT-coach network - f2F
14. ICT-coach network - f2F- frequency
15. ICT-coach network - f2F - objectives
16. ICT-coach weblog
17. ICT-coach vision on ICT in education
18. NMG Network
19. NMG Support
20. NMG virtual community
21. NMG virtual community upload
22. NMG virtual community download
23. ICT-coach target
24. Knowledge Sharing
25. < name> Knowledge website
26. <name> new e-learning environment
27. SIS
28. Digital Portfolio
29. OMP (Question Mark Perception)

## **Appendix 3: Coding scheme for second analysis of interviews**

### **Knowledge**

- K1 ICT coaches' knowledge of his/her assignment in the ICT coach network
- K2 ICT coaches' knowledge of ICT and learning
- K3 ICT coaches' knowledge of university's policy
- K4 ICT coaches' knowledge of other faculties

### **Attitude**

- A1 ICT coach attitude towards the ICT coach network
- A2 ICT coach job application / appointment
- A3 ICT coach attitude towards face-to-face participation
- A4 ICT coach attitude towards virtual participation
- A5 Motivation of ICT coach
- A6 Teacher motivation
- A7 Support of ICT coach

### **Behaviour**

- B1 Active in meeting F2F
- B2 Active participation in VE
- B3 Active knowledge sharing

### **Change Management**

- CM1 Moral purpose
- CM2 Understanding change
- CM3 Relationship Building
- CM4 Knowledge Creation/Sharing

### **Critical Success Factors**

- CSF 1 Time pressure
- CSF 2 Leadership/ Management Support
- CSF 3 Moderator / Facilitator
- CSF 4 Trust and motivation (also A5)

CSF 5 Technology / Usability

CSF 6 Face-to-face activities

**Faculty Member**

FM1 Faculty 1

FM2 Faculty 2

FM3 Faculty 3

FM4 Faculty 4

FM5 NMG

## **Appendix 4: Pre-questionnaire Focus Group Interviews**

### ***Knowledge of the task of the ICT coach***

What do you regard as the most important task of the ICT coach?

Are there other tasks that are specific for this job?

Is there any policy in terms of what you as a coach should achieve?

### ***The support of the ICT coach***

What support do you need in your job as ICT coach?

What support do coaches get from their manager?

What is the role of the Service Centre in this respect?

### ***The attitude of the ICT coach***

To what extend do you think that your job as ICT coach has resulted in a better use of ICT in education?

If you had the choice yourself? Would you spent more time as ICT coach?

How much interest is there among teachers to attend your training sessions and does this affect work as ICT coach?

### ***Behaviour; the knowledge sharing face-to-face or virtual***

How important do you think, is the knowledge sharing between the ICT coaches?

How does this take place? And what do you share?

What kind of knowledge is exchanged between faculties?

What is the role of the new e-place?

## Appendix 5: Example of field notes

The meeting was held in November 2008 in the building of the faculty of Development and Society.

Note: In translating original Dutch quotes into English, some of the richness of a typical Dutch expression was lost. It was aimed to translate these quotes as accurately as possible. It is believed that these translations did not affect the general analysis of the case.

Five coaches were present. The meeting was chaired by two staff members of the NMG (NMG1 and NMG4). Part of the meeting was scheduled to demonstrate a new video application. Before that coaches were asked about their experience with the new e-place of the ICT coach network. One new appointed ICT coach is present and makes a lot of notes. The older coaches don't take notes at all.

First the NMG gave its own impression:

- all ICT coaches have visited the site
- average score per week is 0,5% visits from coaches
- a very small group is 'heavy user'
- majority of the coaches is lurker
- it seems that visits are slightly increasing

Coaches stated the following impressions:

- "the page with announcements is not clear. It is difficult to find what you want."
- "I visit the site now and then. I appreciate it that all announcements are in a central place."
- "I visit the site sporadic. I feel unpleasant by the knowledge that you can track what I am doing. It is much better than the former place. It looks neat, although I have the impression that we first mess around and then see how it works."
- "I like the training material."
- "Better than the former environment. It is a nice place but do I have to read all of the stuff?"
- "it is a strange way to make announcements."
- "we have a look almost every day."
- "This looks much better than the other one."
- "I get too many alerts. You have to disable all alerts."
- "It is nice to be able to find everything."
- "I am also a member of another network and now I have to keep up with three other places as well."
- "There is much doubling with other networks and virtual places."
- "In our e-place we have to link to other places as well."
- "It seems that the e-place for teachers does not work."
- "Teachers don't know how it all works."
- "We also have our Intranet. I noticed that things disappeared from there to this place. Looks like competition between sites."

## Appendix 6: Questionnaire Baseline survey - Teachers

The questionnaire displayed here is an English translation of a Dutch online questionnaire. For multiple choice questions participants could tick boxes. These boxes are not displayed here.

1. What is your gender?
  - a. Male
  - b. Female
2. What is your age?
  - a. < 30 years
  - b. 31-40 years
  - c. 41-50 years
  - d. > 50 years
3. How long are you employed in education?
  - a. Less than 2 years
  - b. More than 2, less than 5 years
  - c. More than 5, less than 10 years
  - d. More than 10, less than 20 years
  - e. More than 20 years
4. How long are you employed in Otto University?
  - a. Less than 2 years
  - b. More than 2, less than 5 years
  - c. More than 5, less than 10 years
  - d. More than 10, less than 20 years
  - e. More than 20 years
5. What is your role in education?  
(more answers possible)
  - a. Teacher
  - b. Developer
  - c. Assessor
  - d. Mentor
6. In which faculty do you work?
  - a. Faculty A - Business Administration
  - b. Faculty B- Education
  - c. Faculty C- Engineering
  - d. Faculty D- Development and Society
  - e. Faculty E- Academy of Information and Communication Technology
7. Did you, in the last year, attend a training at Otto University in the use of ICT?
  - a. Yes
  - b. No
  - c. If Yes, how (more answer possible)
    - i. By an ICT coach
    - ii. By an application manager
    - iii. Self-taught
    - iv. Other such as .....

8. Are you a member of other networks of project teams within Otto University about the use of ICT in education?
  - a. No
  - b. Yes
  - c. If yes, which? (open box)
9. Did you participate in other such networks of project teams in or outside Otto University?
  - a. No
  - b. Yes
  - c. If yes, which? (open box)
10. How in general do you evaluate your skills in the use of computer programs?
  - a. I am an experienced user. I know most of all the possibilities of the programs that I use.
  - b. I am an average user. I can work easily work with most programs.
  - c. I am a less experienced user. I know a few programs and sometimes have to search for possibilities.
  - d. I am an inexperienced user. I only use the computer if strictly necessary.
11. How do you judge your skills in the following programs.

Respondents were asked to tick one of the following choices

- 1 = Very experienced. I know all possibilities
- 2= Experienced. I can easily work with the program and know almost all possibilities
- 3 = Less experienced. I sometimes work with the program and than I have to search for possibilities.
- 4.= Inexperienced. I seldom or never use the program. I don't know the program.

Respondent ware asked to tick boxes for the following programs:  
 Internet - MSN - Skype - Blogs - Wiki's - Blackboard - New E-learning app - Digital Portfolio - Question Mark Perception - ICA - VAL-VLC - BSCW - SIS.

12. Have you ever played a virtual reality game online?
  - a. Yes
  - b. No
  - c. Don't know
13. Below you see three ways how yourself might use ICT. Please tick the box that fits best for you.

With ICT:

- i) Is not intervened in the structure of my teaching. ICT replaces learning objects that I have used before (for example a CD of PFD document)
  - ii) The structure of my teaching has partly changed. My students experience that in the execution and organisation of the education.
  - iii) The structure of my teaching has changed in such a way that it cannot be compared with the first two choices (Think of flexible ways of teaching, presentation, etc)
14. How long do you use an e-learning environment?
    - a. 0-1 years
    - b. 1-2 years
    - c. 2-5 years
    - d. More than 5 years
    - e. I don't use an e-learning environment

Please state the most important reason to use or not to use an e-learning environment (fill in the box)

15. How do you judge the use of ICT with regard to these functionalities?

Respondents could fill in the a Likert scale with the following choices:  
Very useful - Useful - Not useful - not useful at all - don't know

- a. Course or module in e-learning environment
- b. Digital Portfolio
- c. Digital Assessments
- d. Course information about teachers, students, roster and announcements
- e. Communication about the contents of the course between students, teachers (feedback from students and teachers)

16. Below you will find two theses about the use of ICT. Please tick which answer fits best for you.

**Thesis A**

A1. ICT replaces a number of learning objects. If ICT would no longer be available, this would not be a big problem for the structure of my education.

A2. ICT is an integrated part of my education. If ICT would no longer be available, I would have to restructure (a part of) my education.

**Thesis B**

B1. ICT has changed the content, pedagogy and organisation of my education in such a way that, if ICT would no longer be available, my teaching would have to be redesigned completely.

B2. Without ICT the organisation or design of my teaching partly would have to be changed

The next questions deal with your knowledge of ICT in education and your motivation to share your knowledge with others.



17. What would you like to learn with regard to the use of ICT in education? (open question)
18. If you search for knowledge or information about ICT in education, what kind of resources do you use?

Respondents could fill in the a Likert scale with the following choices:  
Almost always - Regularly - Now and than -Seldom or never

- Colleagues in our university
  - Colleagues outside our university
  - Books, magazines, articles from our university
  - Books, magazines, articles outside our university
  - Workshops, meetings, courses, seminars etc
  - Intranet and Internet
  - Other (friends, spouse, children)
19. Have you ever publishes on the E-learning Knowledgenet?
    - a. No
    - b. Yes, namely .....
  20. What is the most important reason not to publish? (more answers possible)
    - No time
    - No subject to publish
    - It is not important for me
    - I feel insecure to publish something
    - Other, namely.....
  21. Are other colleagues allowed to use your learning materials?
    - a. Yes, without restriction
    - b. Yes, but only with reference
    - c. Yes, but .....
    - d. No. I have invested a lot of time in it and I will profit from it first
    - e. No. I don't know if it is useful for others to use
    - f. No, because.....
  22. Can you please state what the strong and weak points are of Otto University with regard to the development of ICT and learning.

## Appendix 7: Questionnaire Baseline survey - ICT coaches

The questionnaire displayed here is an English translation of a Dutch online questionnaire. For multiple choice questions participants could tick boxes. These boxes are not displayed here.

The first part of this questionnaire was the same as the questionnaire that was used for the teachers in this case study. For the ICT coaches 6 additional questions were added.

24.

Respondents could fill in the 5 point Likert scale with the following choices:

1= strongly agree 5=strongly disagree

- Teachers in this university have enough interest to follow internal training about the use of ICT in education.
- In my faculty the use of ICT in education is sufficient
- Many teachers in this university are motivated to use ICT in education
- Most colleagues make too little use of ICT in their teaching practice

25. Why do you participate in the ICT coach network?

Respondents could fill in the 5 point Likert scale with the following choices:

1= very important 5= not important

- Discussion with colleagues
- Getting new knowledge from colleagues
- To get new ideas for my own teaching practice
- To help other colleagues
- To improve education in this university
- To keep my knowledge up to date

26. What do you expect of your role in the ICT coach network? (open question)

27. What are your expectations about the importance of the ICT coach network for Otto University? (open question)

28. How many hours a month do you work as ICT coach?

---- hours

29. Have you noticed already advantages of being a member of the ICT coach network? (open question)

- No
- Yes, namely .....