

Pasi Juvonen

**LEARNING INFORMATION TECHNOLOGY BUSINESS  
IN A CHANGING INDUSTRY LANDSCAPE.  
The Case of Introducing Team Entrepreneurship  
in Renewing Bachelor Education in Information  
Technology in a University of Applied Sciences**

Thesis for the degree of doctor of science (Technology) to be presented with  
due permission for public examination and criticism in the Auditorium 1382  
at Lappeenranta University of Technology, Lappeenranta, Finland on the  
12th of December, 2014, at 12:15.

Acta Universitatis  
Lappeenrantaensis 606

Supervisor Professor (Emeritus) Asko Miettinen  
LUT School of Industrial Engineering and Management  
Lappeenranta University of Technology  
Finland

Reviewers Professor Eila Järvenpää  
Department of Industrial Engineering and Management  
Aalto University  
Finland

Professor Vesa Routamaa  
Department of Management  
University of Vaasa

Opponent Professor Eila Järvenpää  
Department of Industrial Engineering and Management  
Aalto University  
Finland

ISBN 978-952-265-690-2

ISBN 978-952-265-691-9 (PDF)

ISSN-L 1456-4491

ISSN 1456-4491

Lappeenrannan teknillinen yliopisto

Yliopistopaino 2014

“The creativeness of self-actualized man seems rather to be kin to the naive and universal creativeness of unspoiled children. It seems to be more a fundamental characteristic of common human nature – a potentially given to all human beings at birth. Most human beings lose this as they become encultured, but some few individuals seem either to retain this fresh and naive, direct way of looking at life, or if they have lost it, as most people do, they later in life recover it. “

- Abraham Maslow (1970) -



## **ACKNOWLEDGEMENTS**

I have been privileged to be able to take part in several research and development projects during my academic career. These projects have helped me to develop understanding both on the research methodologies used in studying human actions and the expectations practitioners have for education.

This is the fourth time I am confronting a situation where I have to explain what I have learned during the process. It is easy to say that this has been the toughest one. At the same time I have once again noticed that trusting the learning process will take you there, eventually. After a certain amount of gathering information and skills, something will crystallize. The journey has been worth experiencing.

I am grateful to my organization Saimaa University of Applied Sciences for offering challenging duties to keep my thinking versatile enough to develop. These challenges have made it possible to enlarge experiences in IT Bachelor education and examine it from multiple viewpoints.

Special thanks belong to my supervisor Professor (Emeritus) Asko Miettinen, who has been very supportive during the over four-year process. I am also grateful for the constructive and encouraging comments of my previewers, Professor Eila Järvenpää and Professor Vesa Routamaa, who helped me to improve my research. I also want to thank all the colleagues and cooperation parties I have worked with during my career. Because the list would be long I will not name anyone special. Those who have affected my thinking already know it.

Without continuous support from my beloved wife Susanna this could not have been possible. Thank you Susanna, without your remarkable role in coordination of issues concerning our family this project would not have been ever finished. You made it possible for me to concentrate in to doing research when it was needed.

Mäntyharju, October 2014

*Pasi Juvonen*



## **ABSTRACT**

Pasi Juvonen

### **LEARNING INFORMATION TECHNOLOGY BUSINESS IN A CHANGING INDUSTRY LANDSCAPE. Introducing Team Entrepreneurship in Renewing Bachelor Education in Information Technology in a University of Applied Sciences**

Lappeenranta 2014

104 pages

Acta Universitatis Lappeenrantaensis 606

Dissertation. Lappeenranta University of Technology

ISBN 978-952-265-690-2, ISBN 978-952-265-691-9 (PDF)

ISSN-L 1456-4491, ISSN 1456-4491

Speed, uncertainty and complexity are increasing in the business world all the time. When knowledge and skills become quickly irrelevant, new challenges are set for information technology (IT) education. Meta-learning skills – learning how to learn rapidly - and innovation skills have become more essential than single technologies or other specific issues. The drastic changes in the information and communications technology (ICT) sector have caused a need to reconsider how IT Bachelor education in Universities of Applied Sciences should be organized and employed to cope with the change.

The objective of the study was to evaluate how a new approach to IT Bachelor education, the ICT entrepreneurship study path (ICT-ESP) fits IT Bachelor education in a Finnish University of Applied Sciences. This kind of educational arrangement has not been employed elsewhere in the context of IT Bachelor education. The study presents the results of a four-year period during which IT Bachelor education was renewed in a Finnish University of Applied Sciences. The learning environment was organized into an ICT-ESP based on Nonaka's knowledge theory and Kolb's experiential learning. The IT students who studied in the ICT-ESP established a cooperative and learned ICT by running their cooperative at the University of Applied Sciences. The students (called team entrepreneurs) studied by reading theory in books and other sources of explicit information, doing projects for their customers, and reflecting in training sessions on what was learnt by doing and by studying the literature. Action research was used as the research strategy in this study. Empirical data was collected via theme-based interviews, direct observation, and

participative observation. Grounded theory method was utilized in the data analysis and the theoretical sampling was used to guide the data collection.

The context of the University of Applied Sciences provided a good basis for fostering team entrepreneurship. However, the results showed that the employment of the ICT-ESP did not fit into the IT Bachelor education well enough. The ICT-ESP was cognitively too tough for the team entrepreneurs because they had two different set of rules to follow in their studies. The conventional courses engaged lot of energy which should have been spent for professional development in the ICT-ESP. The amount of competencies needed in the ICT-ESP for professional development was greater than those needed for any other ways of studying. The team entrepreneurs needed to develop skills in ICT, leadership and self-leadership, team development and entrepreneurship skills. The entrepreneurship skills included skills on marketing and sales, brand development, productization, and business administration. Considering the three-year time the team entrepreneurs spent in the ICT-ESP, the challenges were remarkable.

Changes to the organization of IT Bachelor education are also suggested in the study. At first, it should be admitted that the ICT-ESP produces IT Bachelors with a different set of competencies compared to the conventional way of educating IT Bachelors. Secondly, the number of courses on general topics in mathematics, physics, and languages for team entrepreneurs studying in the ICT-ESP should be reconsidered and the conventional course-based teaching of the topics should be reorganized to support the team coaching process of the team entrepreneurs with their practice-oriented projects. Third, the upcoming team entrepreneurs should be equipped with relevant information about the ICT-ESP and what it would require in practice to study as a team entrepreneur. Finally, the upcoming team entrepreneurs should be carefully selected before they start in the ICT-ESP to have a possibility to eliminate solo players and those who have a too romantic view of being a team entrepreneur.

The results gained in the study provided answers to the original research questions and the objectives of the study were met. Even though the IT degree programme was terminated during the research process, the amount of qualitative data gathered made it possible to justify the interpretations done.

Keywords: ICT entrepreneurship, team entrepreneurship IT Bachelor education, action research, Grounded theory

UDC 377.6:65.012.431:303:004



## Table of contents

4	
1.	Introduction ..... 1
1.1	Motivation to rethinking IT bachelor education ..... 2
1.2	The research gap ..... 3
1.3	The research objective and question ..... 8
2.	Teams as the educational context for fostering team entrepreneurship ..... 10
2.1	Pedagogical background of the ICT entrepreneurship study path ..... 13
2.2	Knowledge creation ..... 15
2.3	Entrepreneurship education ..... 17
2.4	Group and team ..... 19
2.4.1	Group and team development ..... 20
2.4.2	Prerequisites for a successful team ..... 21
2.5	Summary of the background for teams as an educational context ..... 22
3.	The research framework and methodology ..... 23
3.1	Paradigm issues ..... 23
3.2	The research process ..... 26
3.2.1	Selection of research methods ..... 26
3.2.2	Data collection ..... 29
3.2.3	Data analysis ..... 32
3.2.4	Reflecting on the researchers role and the effect of bias ..... 34
3.2.5	Summary of the research process ..... 36
4.	Summary of the original papers ..... 39
4.1	Development of the learning environment – the trajectory ..... 39
5.	Results ..... 44
5.1	Methods and tools for learning in ICT-ESP ..... 44
5.2	Team entrepreneurs’ perceptions on ICT-ESP ..... 51
5.3	Perceived challenges in using the ICT-ESP ..... 56
5.3.1	The challenging role of a team entrepreneur ..... 57
5.3.2	Versatile role of a team coach ..... 61
5.4	Summary of the results ..... 65
6.	Discussion ..... 67
6.1	Theoretical implications of the study ..... 69
6.2	Implications for practice ..... 70
6.3	Contribution of the study ..... 74

6.4 Limitations of the study.....	75
6.5 Evaluation of the study.....	76
6.5 Future research areas concerning the topic.....	79
7. Conclusion .....	81
8. References .....	83
9. Appendices .....	99
9.1 Appendix 1: First round interview questions .....	99
9.2 Appendix 2: Second round interview questions.....	100
9.3 Appendix 3: Third round interview questions.....	102
9.4 Appendix 4: Interview questions for team entrepreneurs who decided to leave the ICT-ESP.....	103
9.5 Appendix 5: Presentation of the cooperatives.....	104

## LIST OF PUBLICATIONS

Juvonen, P. (2013). Learning to fly? First experiences on team learning of Icaros cooperative. *European Journal of Engineering Education (EJEE)* Vol. 38, No 2, pp. 186-193.

Author contribution: The only author

Juvonen, P. (2012). Fostering Entrepreneurship by Developing a New Learning Environment Within a Finnish University of Applied Sciences, In T. Burger-Helmchen (Ed.): *Entrepreneurship – Born – Made and Educated*, ISBN 979-953-51-0210-6. InTech, Printed in Croatia, pp. 225 – 246.

Author contribution: The only author

Smolander, K., Ovaska, P. and Juvonen, P. (2009). The challenges for small software firms in industry globalization, *International Journal of Globalization and Small Business (IJGSB)*, Vol. 3, No. 1, pp.73–89.

Author contribution: The author made significant part of the literature study, collected part of the data and analyzed the data from one of the two viewpoints selected for the analysis. In addition, the typology of companies' present situation was based on authors Master's thesis. To summarize, the authors contribution for this article was significant.

Juvonen, P. and Ovaska, P. (2009). Organizational Learning literature visited – Fresh lenses to study practices in ISD organizations? Conference article presented in ISD (Information Systems Development) conference Cyprus on 26th of August 2008, In G. A. Papadopoulos, G. Wojtkowski, W. Wojtkowski, S. Wrycza & J. Zupancic (Eds.): *Information Systems Development. Towards a Service Provision Society*, Springer, United States of America, pp. 569 – 577.

Author contribution: The author made the literature study, collected most of the data, and analyzed the data by himself, and was also responsible of the writing process of the article alone. The other author participated to the finalizing phase of the article by commenting it. To summarize, the authors contribution for the article was significant.

Juvonen, P. (2009). Evaluating the Driving Factors and the Suppressing Factors Related to IS Outsourcing in Four Finnish Information Systems Organizations. Presented in ISD (Information Systems Development) conference in Galway, Ireland on 29th of August 2007, In C. Barry, K. Conboy, M. Lang, G. Wojtkowski & W. Wojtkowski (Eds.): *Information Systems Development. Challenges in Practice, Theory, and Education*. Vol. 2, Springer, United States of America, pp. 687 - 698.

Author contribution: The only author

## **List of figures**

<b>#</b>	<b>Caption</b>	<b>Page</b>
1	Background drivers for the study.	7
2	The experiential learning cycle according to Kolb (1984).	14
3	Nonaka's knowledge theory (SECI –process) and its application in ICT-ESP.	17
4	The principles of action research and how they have been utilized in the study.	28
5	Example of selective coding and data reduction.	34
6	The main phases of the research.	38
7	The renewed IT bachelor education (Juvonen and Ovaska 2012).	41
8	Overview of the methods used in learning within the ICT-ESP.	58
9	An overview of the knowledge and skills needed in the ICT-ESP.	56
10	The suggested team coaching process for the ICT-ESP	73

## List of tables

#	Caption	Page
1	Summary of the most essential concepts, theories and body of knowledge concerning the study.	11
2	List of relevant literature concerning team learning and team coaching.	12
3	The research framework and steps of action.	25
4	Summary of the collected data.	31
5	The summary of the contents of the original papers.	43
6	Some pros and cons concerning the ICT-ESP expressed by the interviewees	52
7	Some frustration concerning teamwork expressed by the team entrepreneurs.	53
8	Team entrepreneurs' expressions on the responsibility of an individual's learning process.	54
9	Expressions of team entrepreneurs who decided to leave the ICT-ESP.	55
10	Teams described in literature compared to the teams in the context of the study.	59



## 1. Introduction

The speed, uncertainty and complexity of the business world are increasing all the time. The lifecycle of products and services are shortening and the structures of business domains are changing rapidly. Old structures are collapsing and new businesses seem to emerge from nowhere. At the same time, a lot of low and middle value information and communications technology (ICT) work has been moved to lower labour cost countries. This has happened for over fifteen years and is still happening, in developed countries all over the world.

Within these globalization challenges, it seems probable that some previous knowledge and skills, and jobs and professions will become not so useful in a shorter time than expected. Some old professions will slowly disappear and new professions will emerge. The demands of the future cannot be predicted. Furthermore, it is impossible to predict what kind of new knowledge and competencies will be needed in a few years' time. In fact, educators are preparing young people to professions that might not even exist yet. This is a challenge to the educational system in Finland and no doubt in other developed countries as well. Instead of concentrating on e.g. technologies, we should shift the focus more on meta-skills which will help people to utilize and create new knowledge (Ruohotie 2005; Elmholdt and Brinkmann 2006; OECD report 2007, Dyer et al. 2011), entrepreneurial mindsets and skills (European Commission 2006), and meta-cognition where new knowledge is produced, used and shared within and between communities of practice (Wenger 1998; Cunningham 1999; Wenger et al. 2002) and within teams (Katzenbach and Smith 1993, 2001; Kets de Vries 2011).

In confrontations of everyday life people, employees or groups are faced with unfamiliar and complex problems for which there is no single solution. There may not even be a precise solution or there may be several approximately appropriate solutions to choose from. New knowledge emerges at high speed and at the same time part of previous knowledge becomes obsolete. Organizations have to learn and unlearn (Hedberg 1981; Schein 1993a; Zahra et al. 2011) in parallel at a faster pace than before. This means also an ability to let go (Senge et al. 2004) and to develop new innovative ways of operating at a fast pace (Denning and Dunham 2010; Hamel 2012). These issues are important for every organization because in the contemporary context of ever faster change the pace of learning has to match or exceed the rate of change for organizations to survive (De Geus 1997; Boud et al. 1985, 2006; Greenberg and Baron 2008).

What should be learned and when is changing rapidly, and educators at all levels will have to bear their responsibility and do their best to equip young people with skills they need to be able to cope with the change. A new set of skills, including the ability to learn rapidly (Senge et al. 1999, 2000), is needed. Engineering education worldwide has to find ways to pay attention to the remaining analytical rigor of the education and at the same time increase students' abilities in systemic thinking, innovation, and a holistic view of the complex challenges of the twenty-first century (Schön, 1994; Galloway 2008; Denning and Dunham 2010; Gattie et al. 2011). This new set of skills has been presented in framework called Entrepreneurship education (Ministry of Education, 2009; Hytti, 2002). Educators are in a crucial role in fostering the Entrepreneurship education (European Commission 2012, 2013).

Similar challenges to the ones described above are met in issues concerning leadership. Many employees are perplexed with the complexity and they feel helpless (Schein 2004; Kouzes and Posner 2007; Saarnio and Hamilo 2013). Learning with peers and leadership are tightly connected together. Leadership is no longer seen as a set of individual traits, but rather as a means of how leaders will be able to activate and inspire the strengths of their team members and build an atmosphere where the team members feel safe to learn and make mistakes – skills which have become an essential part of learning. Furthermore, self-leadership skills (Hock 2005; Sydänmaanlakka 2006; Kouzes and Posner 2007) have become essential for the success of any organization. So, new methods and practices to cope with both the learning and the leadership, are required (Hackman et al. 2005; Haslam et al. 2011).

### 1.1 Motivation to rethinking IT bachelor education

The author has had the opportunity to work as a teacher and tutor for learning for almost twenty years. Since 1996, the authors' conception on learning has been that learning by doing and reflection on what has been learnt, and how it was learnt, supported by the evidence of “what is already known” are important elements of the learning process. The practice-oriented emphasis on learning combining theory and practice, started originally an interest in understanding the versatility of learning methods and their pedagogical background.

The motivation for the study has been twofold. Firstly, the professional development as a teacher, a tutor for learning, and in recent years also as a team coach. Due to the drastic changes in the ICT sector during the last two decades IT bachelor education faced a lot of changes. The second source



of motivation has been to develop (with several colleagues) the IT Bachelor education to meet the changing requirements of the 21<sup>st</sup> century.

## 1.2 The research gap

To describe the versatile paths which have originally led the author to study the subject - and to express it in a written format as a short version - has been a challenging task. The author has always been interested in participating sound development. Therefore the trajectory of what led to studying the subject feels quite obvious to the author. In this chapter the guiding ideas and need to start and conduct the current study are explained.

### **Challenges of the 21<sup>st</sup> century school system**

- All our youngsters are “digi-natives”
- Complexity increases, and changes are rapid
- Information becomes irrelevant very soon, meta-learning skills – learning how to learn – are more essential than factual information
- Schools will become crossroads of teaching, learning and knowledge (Smeds et al. 2010).

Knowledge management plays a key role in the world of information overload and knowledge-based economics. Traditionally, as previous OECD analysis has shown, education has not been an exemplar of its own knowledge management, despite of “knowledge” being the core business of education. (OECD 2012). The teachers in Finnish Universities of Applied Sciences are used to working mostly alone or with their nearest colleagues (Mäki 2012). The complex requirements for students’ learning objectives will require more collaboration - practices such as knowledge sharing and generative and reflective dialogue. A need for coping with change in education to avoid the risk of isolation of in-school learning has also been noted by several authors a long time ago (Resnick, 1987; Engeström 1991; Michaelsen et al. 2002; Push & Bergin 2005; Kujala et al. 2012; Virkkunen et al. 2010). The education system has to adapt to the changes going on in the industry.

### **Need for learning environments supporting entrepreneurship**

The Finnish Ministry of Education and Culture (former Finnish Ministry of Education) has set objectives for supporting entrepreneurship in Finnish Universities at the national level (Ministry of Education 2004; 2009). The objectives set by the Ministry of Education and Culture are

summarized as follows: 1) university-level entrepreneurship is encouraged by integrating entrepreneurship broadly to studies in Universities of Applied Sciences, 2) universities of Applied Sciences will coordinate the work ensuring that cooperation between students and working life is systematically deepened during university studies, 3) internal and external entrepreneurship is promoted, new business is created, and innovation enhanced, 4) an entrepreneurship culture and a mindset and climate conducive to entrepreneurship are created. (Ministry of Education 2009). The special role of the Universities of Applied Sciences (Polytechnics) is to train professionals in response to labor market needs and conduct R&D which supports instruction and promotes regional development in particular (Minedu, 2014).

Rajala et al. (2010) have presented a need to reconsider the role of school as a part of the modern learning environment. They emphasize the role of external regional and national networks, by which both the developers of the learning environment and the learners would be able to exchange their experiences. Learning has become ubiquitous (Barron 2006), as the learning environment is all around us.

### **Employing team coaching to support team-based learning**

Most of the educators at any level from preschool to PhD programs at universities try to equip their students with information and skills they find important and useful. However, a lot of education is still based on classroom teaching where the problems presented have single definite solutions and sometimes they are even found in the last pages of the textbooks used in teaching. This kind of education does not activate students to take responsibility of their own learning process.

The team coach (Hackman and Wageman 2005) act as a learning coach for the team members. The role goes far beyond the role of the traditional teacher. The team coach will face surprising incidents and challenges every day and there is no possibility to get prepared for all of them. These challenges are related to both team dynamics and the substance. When the idea of team coaching is examined from a broader viewpoint, the challenges of the 21<sup>st</sup> century concerning learning in the field of education and in any organization are also much more complex than ever before. That is why the European Commission (2013) encourages European educators at all levels to reconsider the curricula of education and methodologies used in teaching and learning. The European commission defines entrepreneurial teachers as follows: “...*they follow a flexible and adaptable study plan and prefer interdisciplinary, project-based learning; using training material rather than textbooks. They put emphasis on group processes and interactions; and understand the class room sometimes as a ‘clash room’*,”

*giving room for diversity – a diversity of opinions, answers and solutions and the reflection about the learning process.” “...an entrepreneurial teacher is more of a coach than someone who lectures. They support the individual learning processes of students and the development of personal competences.”(European Commission 2013, p.5)*

Essential points for improvement in Finnish engineering education are related to the curricula of degrees and methods of learning (Mielityinen 2009), which are two elements of the learning environment. By reconsidering all the elements of the learning environment (physical, social, technological, local and didactical), we can build environments which support learning effectively (Manninen et al. 2007).

Berson et al. (2006) ask, based on Nonaka’s principles of turning tacit knowledge into accessible knowledge, what type of leadership would promote such practices. Do leaders need to form a vision that will guide or motivate individuals’ sharing of knowledge? How should leaders encourage employees to become aware of their mental skills and share their tacit knowledge with coworkers to form common mental models?

Coaching interventions and their effects on performance should be studied also at group and organization levels. (Kauffman and Scoular 2004). Hackman and Wageman (2005) suggest that instead of asking “How much difference does team coaching make?”, scholars might expend resources more productively in further research on the structure and conditional conditions under which competent team coaching does (and does not) affect team performance significantly.

Elements of team coaching have also been described as an apprenticeship approach (Hassan 2001). Hassan puts it “An element of apprenticeship approaches is that the teacher’s thoughts and actions are explicitly revealed to the student, who models these approaches in his / her own activity” (op. cit., p. 332). Suominen (2013) argues about the role of leadership rather than management. He connects the management approach to single-loop learning, where the meaning of actions is not a subject of questions. The leadership approach is more like double-loop learning where the meaning of current actions is questioned, and triple-loop learning, where empowerment is possible and radical changes in individuals’ perceptions of learning and reality overall may take place. The cultivation of communities of practice (Lave and Wenger 1991; Wenger 1998; Wenger et al. 2002; Thompson 2005; Rohde et al. 2005) has been found a promising approach into the new context of learning and leadership.

The need for a new type of flat organizations, hot groups, shared leadership, self-leadership, team leadership, and innovative learning methods has been emphasized also in the management and

business literature (Leavitt 1996; Lipman-Blumen and Leavitt 1999; Belbin 2001; Hock 2005; Hamel and Green 2007; Kouzes and Posner 2007; Marquardt 2009; Hamel 2012).

### **The need to develop IT Bachelor education**

The normative curriculum of professional education still follows the hierarchy of professional knowledge (Schön 1994). First, students are exposed to the relevant basic science, then to the relevant applied science, and finally to a practicum in which they are presumed to learn to apply classroom knowledge to the problems of practice. The education of students of engineering has developed slowly during centuries, in a context where changes were slow and technology was totally different compared to the technology of today (Virkkunen et al. 2008).

However, the current industry requirements for engineering students seem to call for a different set of skills, which cannot be achieved by purely following the conventional means that are currently (mostly) used in education. The skills needed are e.g. team working skills / communal learning skills, problem solving skills, leadership and self-leadership skills, as well as innovativeness, shared expertise, and an ability to reflect on one's own attitude and values (Meristö et al. 2008; TEK 2009). Due to the ongoing and rapid and structural change in the ICT sector (Leppimäki et al. 2007; Ylä-Anttila 2012) a new set of skills is needed for IT engineering education, such as ICT services (maintenance, life cycle services), Green IT, language and cultures, leadership skills, and entrepreneurship, especially start-up entrepreneurship (Ylä-Anttila 2012).

Engineering has evolved through a process of steadily increasing specialization, which has gradually divided the profession into smaller component parts (Galloway 2008). The 21<sup>st</sup> century engineering education should focus on working in teams, consider social issues, understand political and economic relations between nations and their peoples, and understand intellectual property, project management, multilingual influences, and cultural diversity, as these factors will drive the engineering practice of the 21<sup>st</sup> century (Galloway 2008). The engineers must be much better equipped not only to function in the global economy but to flourish in it, and their education must include instruction in communication, multiteam participation, design of complex systems, multiculturalism, and languages. (ibid.). Because IT engineers will work in the service business building support processes for every other domain, the skill set mentioned above will be essential to IT and ICT engineers as well. The background drivers for the study are presented in Figure 1.

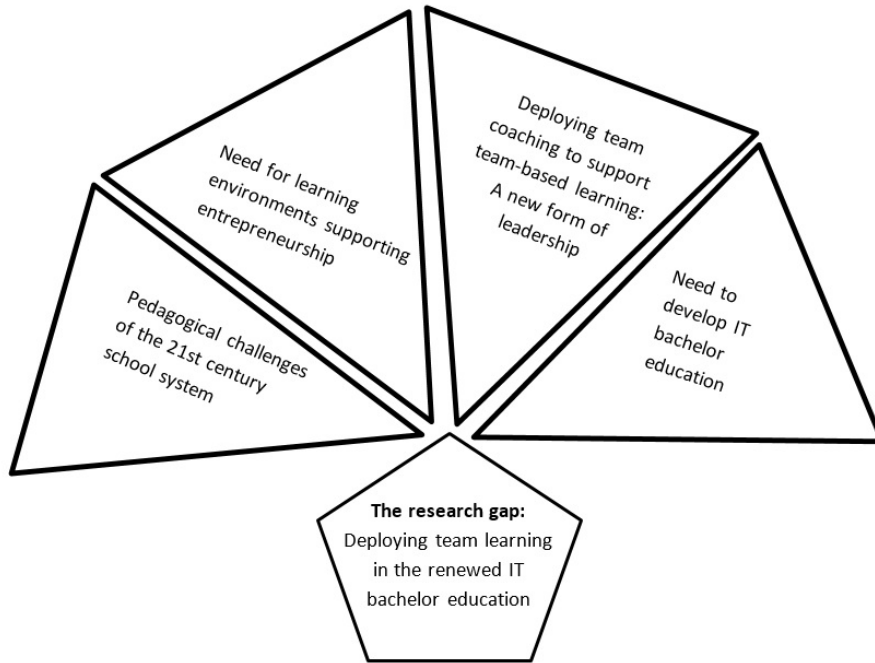


Figure 1. Background drivers for the study.

Based on the literature above there is a need to reconsider both the objectives of and the methods used in IT Bachelor education and also the organization of the learning environment. This study concentrates on describing how ICT entrepreneurship supported by team learning methods has been used in IT Bachelor education at a Finnish University of Applied Sciences and how this approach may help to fill the current research gap.

Team entrepreneurship supported by team learning methods has been utilized earlier in higher education in Finland in marketing and entrepreneurship studies (Tiimiakatemia; Proakatemia). However, they have not been used in IT Bachelor education at this range at Universities of Applied Sciences in Finland before. Therefore, the observations made during the study will provide new insights into the appropriateness of the principles concerning team entrepreneurship, team learning methods, and team coaching process in the IT Bachelor education context.

### 1.3 The research objective and question

The motivation for studying team entrepreneurship and team learning was to be able to understand how the ICT-ESP supported with team learning methods would fit the IT Bachelor education in a Finnish University of Applied Sciences. Team entrepreneurship had been earlier employed mostly in business administration education in Tiimiakatemia since 1993 and in Proakatemia since 1999. Both Tiimiakatemia and Proakatemia are education units specialized in entrepreneurship education.

In the end of 2009 when the decision to renew the curriculum for IT Bachelor education at Saimaa University of Applied Sciences started to crystallize the author decided to do his PhD related to the subject. The original goal was to describe the kind of structures, competences, and negotiations that would be needed to implement the vision of ICT entrepreneurship as a learning environment. Soon the research problem was narrowed to the learning environment and the methods needed to support ICT-ESP employed in IT Bachelor education at Saimaa University of Applied Sciences. ICT entrepreneurship supported with team learning methods had not been deployed elsewhere within a University of Applied Sciences so there was no exact framework available for comparison or benchmarking. Thus, the decision to study the subject with qualitative research methods was obvious from the very beginning of the study.

### **The research question**

Glaser (1992) has argued that the research question in a Grounded theory study is not a statement that identifies the phenomenon to be studied. The problem emerges and questions regarding the problem by which to guide theoretical sampling emerge. Glaser goes on by giving a direct advice to a researcher who wishes to utilize the Grounded theory method (ibid, p.25) “Think theory, talk everyday common sense English.” The main research question from the beginning of the study was:

***Do a learning environment based on ICT entrepreneurship supported with team learning methods fit into the IT Bachelor education?***

Several subquestions emerged via theoretical sampling (Corbin and Strauss 2008) during the research process to complement, and to provide a viewpoint and depth for the main research question. The subquestions were formulated as follows:

- What are the roles and responsibilities of the student (called team entrepreneur) acting within the learning environment?
- What are the roles and responsibilities of the team coach within the learning environment?
- What kind of challenges will be faced in applying the ICT-ESP and how can they be met in a productive way?
- What kind of team coaching processes will be needed to support the team entrepreneurs studying IT at the ICT-ESP?

The questions served as a versatile basis for analyzing the data, and they also provided a useful set of leads for future theoretical sampling. Also a huge amount of collected qualitative data is available for future studies related to the research topic.

## 2. Teams as the educational context for fostering team entrepreneurship

This chapter introduces the essential concepts, theories and body of knowledge, on which the ICT entrepreneurship study path (ICT-ESP) was based on. First, the phenomena the researcher studied during the literature study are shortly introduced in Table 1 below, and then selected themes are discussed further. The chapter ends by clarifying the pedagogical stance taken in the study.

### **Significance of the context, the abundance of themes, and the researcher's trade-off**

Contextual factors play an important role in almost any study (Hackman 2003; Johns 2001) and their meaning has been mostly seriously underestimated. The contextual background for this study consists of several factors which are all interrelated to each other. The results gained in the study have to be interpreted through the contextual lenses and it is necessary to recognize that contextual factors may affect the results even more than is usually understood (Goodman 2000). On the other hand, when studying human beings in organizational settings the amount of contextual factors is always great (Johns 2006).

Considering the context of the current study - human beings studying as team entrepreneurs (continuous change process) within a certain learning environment, with the support of a team coach and methods used for team learning (including an unconventional approach to learning and leadership), all this taking place at a Finnish University of Applied Sciences (educational institution) – the contextual factors are diverse. The relevant concepts and theories associated with the current study of ICT-ESP as an educational context (the learning environment) are presented in Table 1. Previous studies related to team learning and team coaching are presented in Table 2.



Table 1. Summary of the most essential concepts, theories and body of knowledge concerning the study.

<b>Topic(s)</b>	<b>Literature on the topic(s)</b>
Experiential learning, action learning, action research learning, social learning theory	(Bandura 1977; Vygotsky 1978; Kolb 1984, Wenger 1998; Marsick 2002; Johnson and Johnson 2003, Honey and Mumford 2005; Marquardt 2009; European Commission 2013)
Entrepreneurship education, entrepreneurial intentions	(Bird 1988; Krueger et al. 2000 ; Shane, 2003; Choi and Spemherd 2004; Gibb 2005 ; European Commission 2006, 2013; Pihkala 2008; Kuratko et al. 2011; Stenholm et al. 2012; Kew at al. 2013; Suominen 2013; Amorós et al. 2014; Wang and Chugh 2014)
Team development, team performance, group dynamics, motivation	(Bion 1959; Tuckman 1965; Tuckman and Jensen 1977; Bandura 1986; Gersick 1988; Graham and Weiner 1996; Forrester and Drexler 1999; Katzenbach and Smith 1993, 2001; Selignam and Csikszentmihalyi 2000; Chang et al. 2003; Johnson and Johnson 2003; Levi 2007; Amabile and Kramer 2012)

Table 2. List of relevant literature concerning team learning and team coaching.

Knowledge management and knowledge creation in organizations	(cf. Kolb 1984; Isaacs 1993; Nonaka 1991, 1994; Nonaka and Takeuchi 1995; Von Krogh et al. 2000; Morey et al. 2000; Reinhardt 2000; Huysman and De Wit, 2002; Burstein and Linger 2003; Nonaka and Toyama 2005)
Team-based learning / team learning, communities of practice	(cf. Lave and Wenger 1991; Lave 1993; Wenger 1998; Michaelson et al. 2002; Marquardt 2002; Wenger et al. 2002; Edmondson et al. 2001, 2007; Jacques and Salmon, 2007)
Team leadership, self-leadership, team coaching	(cf. Cialdini 1984; Kelley 1992; Senge 2006; Goleman, 1998; Cooper et al. 2001; Downey 2003; Isokorpi 2003; Kvist et al. 2004; Hackman and Wageman 2005; Jenkins and Jenkins 2006; Schuman 2006, 2010; Clutterbuck 2007; Kouzes and Posner 2007; Greenberg and Baron 2008; Kleiner 2008; Rogers 2004, 2008; Douglas, 2009; Ranne 2009; Ristikangas and Ristikangas 2010; Hawkins 2001; Sibbet 2011; Tuominen 2013)
Methods for team learning and innovation	(cf. Schon 1983, 1987, 1994; Resnick 1987; Mezirow 1990; Isaacs 1993, 1999; Argyris and Schön 1996; Bohm 1996; Schein 1993b, 1997; Boyd et al. 1985, 2006; Huttunen, 2003; Säljö 2004; Gray 2007; Clutterbuck 2007; Denning and Dunham 2010; Forrester 2011; Hickson 2011; Hamel 2012; Tannenbaum and Cerasoli 2012; Johns 2001, 2006; Suominen 2013; Lefstein and Snell 2014)

## 2.1 Pedagogical background of the ICT entrepreneurship study path

People learn in the process of trying to achieve valued goals. We find ourselves in situations in which we wish to attain something, but are not sure how to go about it (Wells and Claxton 2002). What has to be mastered changes constantly, and so the process of learning and reflection becomes more important than the content of what has to be learned (Elmholdt and Brinkmann 2006). Part of the learning takes place at the individual level, but today more and more learning takes place within a working group or a team, where individuals learn and reflect on their learning results together. Learning has been studied at multiple levels, such as individual, group / team and organizational levels. This study concentrates on the team level, and the organizational level is only shortly mentioned here. Individual and team level learning are tightly connected together and interdependent on each other, so these two go hand-in-hand throughout the study.

Any organization (or a group) is a collective of individuals, each of whom has developed and stored meaning structures, and is capable of creating new meaning from their interface with their environment and each other (Argyris and Schön 1996). Observing the environment to gain new information, practice to create new knowledge, and reflection of what has been learnt (and what should be learned next) are the crucial building blocks of any communal learning theory, regardless of the nuances of the specific theory.

Kurt Lewin and Jean Piaget are the founders of the early versions of experiential learning (and constructivist) theories. Lewin (Smith 2001) developed a four-stage cycle of action research with reflection, planning, action and observation. David Kolb (1984) built on the previous work of Lewin and observed the processes associated with the perception of concrete experiences and different types of learning styles associated with each process. The theory is known as Kolb's experiential learning theory. The experiential learning theory defines experiential learning as a process whereby knowledge is created through the transformation of experience. Kolb's model consists of a four-stage learning cycle: 1) concrete experience, 2) reflective observation, 3) abstract conceptualization, and 4) active experimentation.

Kolb (p. 194) defines affectively complex learning environments as: "...ones in which the emphasis is on experiencing what is actually like to be a professional in the field under study. Learners are engaged in activities that simulate or mirror what they would do as graduates, or they are encouraged to reflect upon an experience to generate these insights and feelings. The information discussed and generated is more often current / immediate. It often comes from expressions of

feelings, values and opinions by the learner in discussions with peers or the teacher. Such expressions of feelings are encouraged and seen as productive inputs to the learning process. The learner's activities often vary from any prior schedule as a result of the learner's needs. The teacher serves as a role model for the field of profession, relating to learners on a personal basis and more often as a colleague than an authority. Feedback is personalized with regard to each individual's needs and goals, as opposed to comparative. It can come from both peers and the teacher. There is accepted discussion and critique of how the course is proceeding, and thus, specific events within a single class session are often more emergent than prescribed". Kolb's experiential learning cycle is presented in Figure 2.

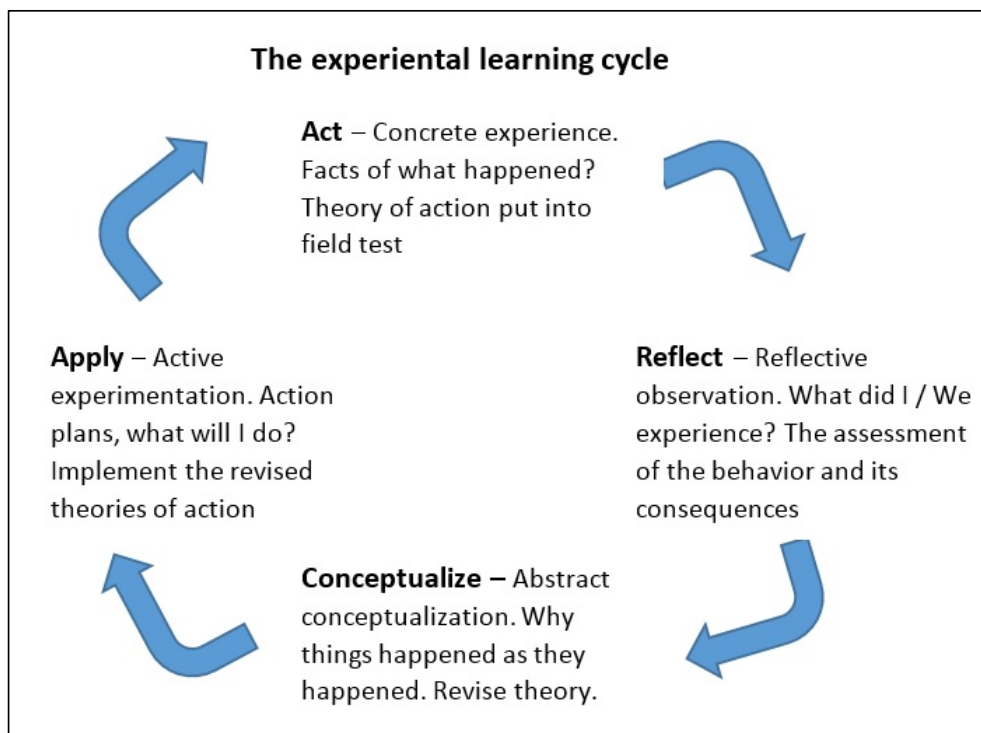


Figure 2. The experiential learning cycle according to Kolb (1984).

The constructivist (originally based on Jean Piaget) approach to learning sees knowledge as a constructed result of an activity (not transmitted), and meaning-making as a social process including discussion. Knowledge building is seen to require articulation, expression, or representation of what is learned (Callison and Lamb 2006).

The ICT-ESP utilizes also views based on the social learning theory (Bandura 1977, 1986), which claims that individuals learn through observing and modelling others, and that seeing others to have rewards or punishments has a powerful influence on their behavior. These arguments are supported by studies on communities of practice (Lave and Wenger 1991, Wenger 1998; Wenger et al. 2002) which claim that learning, meaning and the identity of the learner are constructed within communities of practice and the behavior of other peers within the community has an essential role in communal learning.

Action learning (Marsick 2002; Marquardt 2009) is learning through work on real-life problems. Action reflection learning (Marsick 2002) emphasizes the role of a learning coach in helping individuals actively to reflect (Mezirow 1991; Argyris 1991; Boyd et al. 1985, 2006) in order to draw out a deeper set of lessons learned. In an ideal situation all the operations mentioned here would run smoothly in the organizational context and the objective of the learning organization (Senge 1990, 2006; Senge et al. 1999, 1999, 2000) would be achieved.

## 2.2 Knowledge creation

There seems to be a general understanding and agreement on the fact that knowledge is the central source of organizational success, regardless of whether it is referred to as an invisible asset, absorptive capacity, core competence, strategic asset, core capability, intangible resource, organizational memory, or intellectual capital (Reindhardt 2000). A barrier for creating new knowledge within an organization, particularly in the academic world, is that most educators frame problems for projects where they know the target response or solution. According to Kolb (1984) these are symbolically complex learning environments. This kind of arrangements will block both creativity and innovation (Sosa 2001; Hamel 2012).

The two main perspectives of knowledge management (KM) studies are the technology perspective and social perspective. The technology perspective concentrates on fostering knowledge management by developing information systems and other technical and managerial systems. Although the technical perspective of KM has been studied since the 1990s there are still some examples of KM systems guaranteed to be used to increase productivity (Presbury et al. 1997). The

social perspective of KM concentrates on studying on social activity and discursive behavior as a part of organizational learning. KM is about building informal / intangible learning environments supported by appropriate kinds of behavior (Prieto & Easterby-Smith 2006).

In western epistemology, knowledge has been defined as a “justified true belief” (Nonaka and Toyama 2005). This definition gives an impression that knowledge is something objective, absolute, and context-free, which it is not. It is humans who hold and justify beliefs. Knowledge cannot exist without human subjectivities and the contexts that surround humans. “Truth” differs according to who we are (values) and from where we look at it (context). In organizational knowledge creation, it is such differences in human subjectivities that help create new knowledge. Information is a flow of messages, whereas knowledge anchored in the beliefs and commitment of its holder is created by that flow of information (Nonaka et al. 2001). This follows the autopoietic view of knowledge (Vicari et al. 1996), which defines knowledge as: a) creational and based on distinction-making in observation b) history-dependent and thus context-sensitive, and c) not directly transferable.

Nonaka’s SECI (Nonaka 1994; Nonaka and Takeuchi 1995; Nonaka and Toyama 2001, 2003, 2005) process is one of the theoretical cornerstones beneath the organization of the ICT-ESP. The SECI model describes the interplay between explicit and tacit knowledge and how transformation of the two types takes place in the context of a cooperative. The SECI model consists of 1) *socialization* (tacit to tacit), 2) *externalization* (tacit to explicit), 3) *combination* (explicit to explicit), and 4) *internalization* (explicit to tacit) phases. The team entrepreneurs were able to internalize their explicit knowledge to tacit knowledge during their customer projects. The SECI process is presented in Figure 3.

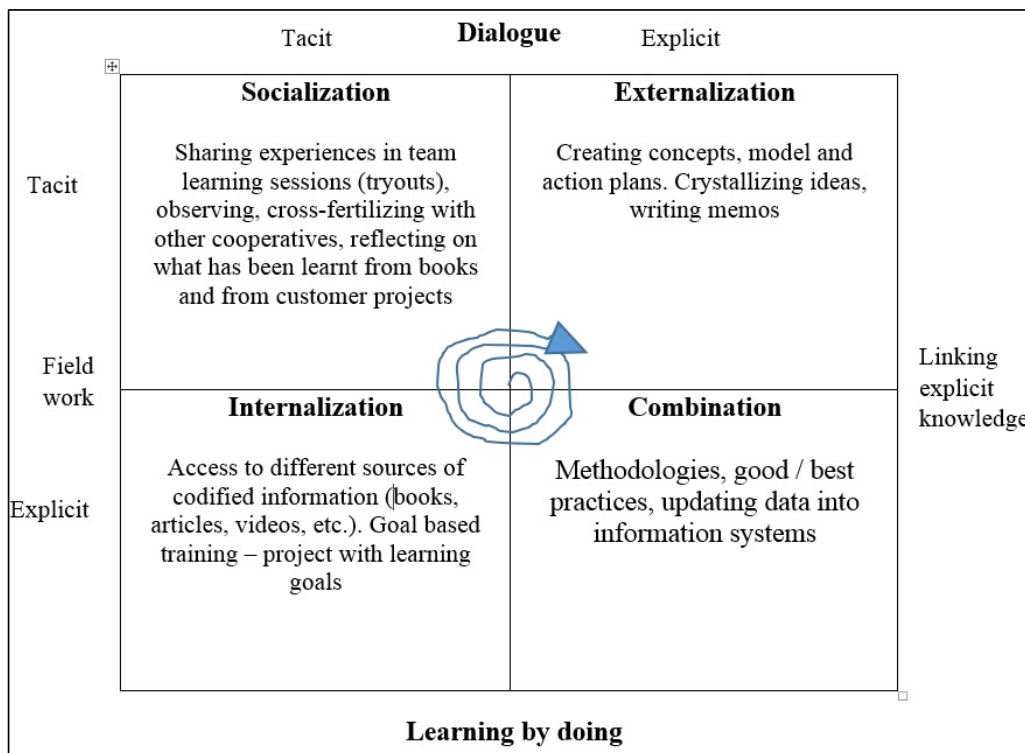


Figure 3. Nonaka’s knowledge theory (SECI –process) and its application in ICT-ESP.

### 2.3 Entrepreneurship education

An *entrepreneur* is someone regarded as a chosen one who possesses special abilities to spot and exploit commercial opportunity (Kuratko et al. 2011), someone who perceives an opportunity and creates an organization to pursue it (Bygrave and Hofer 1991) by creative destruction and new innovations (Schumpeter 1990). The entrepreneur is also defined as the key unit of analysis of an entrepreneurial organization (Shane 2003), and as an act of opportunity exploitation by an individual (Choi and Shepherd 2004). These definitions represent two viewpoint of how an entrepreneur is seen – as an economic concept and as a social psychology concept. An integrative definition has been provided by Shane (2003), who defines an entrepreneur as an individual who is involved in an activity of discovery, evaluation, and exploitation of opportunities to introduce new goods and services, ways of organizing markets, processes, and raw materials through organizational efforts that did not exist before previously. *Entrepreneurship* can be seen as a way of

thinking that sees opportunities rather than threats (Krueger 2000). It is a process that takes place over time (Carrier and Kyrö 2005).

There is no consensus about the meaning of *entrepreneurship education* (Shane and Venkataraman 2000). The definition adopted at the European level suggests that the concept of entrepreneurship education is much wider than just training on how to start a business. Entrepreneurship is firstly a mindset. As attitudes take shape already at an early age, school education can greatly contribute to fostering entrepreneurial mindsets, starting from primary school (European Commission 2006). Entrepreneurship education is seen as crucial and it is suggested that it should be at the core of any nation's education policy (European Commission 2005). Entrepreneurship education has three aims: 1) learning to understand entrepreneurship 2) learning to become entrepreneurial (*internal entrepreneurship*), and 3) learning to become an entrepreneur (*external entrepreneurship*) (Hytti 2002). Remes (2003) has suggested that entrepreneurship education should be considered both as a method of learning and as a content of learning. Also a university context (in parallel with family social / cultural context, and personal motives) has been found to be essential for *entrepreneurial intentions* to develop (Sieger et al. 2014). Entrepreneurial intentions at an early stage of life have been found to have a positive correlation to entrepreneurial activity later in life (Krueger et al. 2000; Aldrich 2006).

Scholars have been criticized for limitations in entrepreneurship education programmes (Dilts and Fowler 1999; Bennett 2006). They have found out that educators who lack either pedagogical knowledge and skills, or experiences on entrepreneurship may provide wrong perceptions of entrepreneurship to their students. Stenholm et al. (2012) list more reasons for why entrepreneur education is challenging: 1) attitudes and resistance to change, 2) lack of pedagogical skills, 3) structures and inflexibility of curricula, 4) lack of entrepreneurial education skills, and 5) problems with the salary system. Educational change – like recreating a curriculum - is more about education of teachers than education of pupils (Scwartz 2006).

More critique has been recently presented by Pihkala (2008), who argues that content-related entrepreneurship education has even decreased the entrepreneurial intentions of students. He suggests that scholars should focus rather on the self-efficacy and self-esteem of students than on the content, such as business administration. Leskinen (1999) suggests that entrepreneurship education should consist of projects and professional practice emphasizing teamwork, creativity, and risk taking. Hytinkoski et al. (2011) present that cooperatives could be an appropriate context



for entrepreneurship education. They go on by suggesting that cooperative thinking could be a workable tool as a compensator between the different and often complex elements of entrepreneurship education, so that the wholeness supports learning. A good overview of previous research concerning entrepreneurship education and entrepreneurial intentions has been made by YKTT (2013).

Gibb (2005) supports the constructivist approach by presenting that the pedagogy of entrepreneurship education is focused on student's activity in learning. The learning situations are flexible, interactive and based on multidimensional knowledge development. Knowledge is built together and mistakes are regarded as a part of the learning process. Therefore, the pedagogy of entrepreneurship education is based on socio-constructivism. Gibb (2007) goes on by arguing that in most entrepreneurship educations, it seems that like the dominant teaching methods are lectures, cases, projects and entrepreneur/stakeholder presentations, which may or may not be delivered in a manner designed to stimulate entrepreneurial behavior. These teaching methods can be an anti-entrepreneurial mode because they are usually delivered in the confinement of the classroom (Shepherd and Douglas 1996).

## 2.4 Group and team

A group (or a working group) is usually defined by four criteria: 1) two or more people in a social interaction, 2) stable structure, 3) the members share common goals, and 4) the members perceive themselves as a group (Greenberg and Baron 2008). Although a group and a team share some characteristics, working groups are usually used in situations where the tasks do not have strong interdependencies and they can be easily shared among the group members. Usually there is a single leader in a working group, whereas leadership may change or can be shared in a team. A team is a special kind of a group (Johnson and Johnson 2003; Greenberg and Baron 2008; Levi 2007).

To separate a team from a group a team can be characterized as follows: 1) the tasks are interdependent of each other, 2) the members have complementary skills 3) the members have set of performance goals for which they hold themselves mutually accountable, 4) the members are to some extent free to set their own goals, timing, and the approach that they wish to take, and 5) the members share common commitment to a purpose (Greenberg and Baron 2008). Katzenbach and Smith (2001, p. 7) define team discipline as follows: "When groups effectively apply the team

discipline, the group, not the formal leader, determines the performance rationale and purpose for group work, and the group establishes the required individual and collective contributions and pattern of communications. The group also sets the requirements for success and how and when to evaluate progress.” Groups have also become a fad meaning that many teams in organizations today are formed without much forethought along with the expectation that only gains in productivity can result from teamwork (Salas et al. 2004; Salas et al. 2008a, 2008b).

Group dynamics (Zander 1994; Hogg and Tindale 2001; Johnson and Johnson 2003; Kopakkala 2005; Levi 2007; Forsyth 2010; Kets de Vries 2011) studies the complex phenomena which affect group members when operating together. A trio of well-known phenomena of group dynamics is dependency, flight/flight, and pairing (Bion 1959; Wheelan 1994; Pennington 2002). Every team coach has to be aware of how these phenomena affect team development and that way also hinder or foster team performance.

#### 2.4.1 Group and team development

Team stages according Tuckman (1965) and Tuckman and Jensen (1977) are *forming* (orientation, members getting to know each other), *storming* (conflict, disagreement about rules and social relationships), *norming* (structure, establishment of rules and social relationships), *performing* (work, focus on completing the task), and *adjourning* (dissolution, completion of task and end of the group). Most groups will stay in the first two stages because they have not worked through their earlier problems. Forrester and Drexler (1999) call their model of team development TPM, (team performance model), where the first phase is *formation*. The formation phase is followed with the *dependability* phase. In the dependability phase, the team starts to build a foundation of trust by sharing information and depending on each other in their operations. When there is a certain amount of trust, the team can *focus* on the common goals. In the *Buy-in* phase, a power balance is searched. The *coordination* phase starts when the team starts to organize its action to achieve the operational goals. The final phase of the TPM model is *vitality* which means that there are intrinsic values in the work the team members are doing.

Other models of team-development found in the literature are the *equilibrium model* (Bales 1966) which suggests that groups balance their needs for task completion and relationship development, the *punctuated equilibrium model* (Gersick 1988), according to which each team has its own pattern of development, but all teams experienced periods of low activity, followed by bursts of energy and change. In addition, each team has a midpoint crisis in which its members realized that half their

time has gone but the project is still in its early stages of completion. The *recurring phase model* of teamwork (Marks et al. 2001) claims that teams perform in temporal cycles of activity that create rhythm for the team. The cycles may vary from a few hours to multi-year ones.

At a general level these different approaches to models of team development represented above have been joined by Chang et al. (2003). They have combined the differences and similarities between the integrative models, and the equilibrium models and conclude that the models have lot of similarities, and both team development models will help in planning and facilitating group development.

#### 2.4.2 Prerequisites for a successful team

The conditions where teams can flourish have also been studied a lot. Some studies concentrated on motivational factors while others approach the issue from a structural or a contextual viewpoint. To be successful, teams should be given / or should develop: group cohesiveness (Cartwright and Zander 1960), leadership and facilitation of team interactions (Levi 2007), common sense of purpose and empowerment to make decisions (Greenberg and Baron 2008), psychological safety (Edmondson et al. 2001), context for sharing experiences (Marquardt 2002), clear goals and standards of excellence (Larson and LaFasto 1989), commitment to a common purpose (Clutterbuck 2007), and a culture of discipline and individuals with an appropriate attitude towards performance goals (Collins 2010).

Knowledge is dynamic, as it is dynamically created in social interactions. When individuals engage into social interactions they become members of communities of practice (Brown and Duguid 1991; Lave and Wenger 1991, 1998, 2005). They may also establish official working groups or teams. Sharing knowledge across teams and wider to the organization has been a successful practice for many organizations (Katzenbach and Smith 2001; Edmondson et al. 2001; Steiber and Alänge 2013).

To provide appropriate circumstances for building trust and creating new knowledge within an organization, certain social structures are needed. When these social structures start to emerge, an appropriate environment for their knowledge creation (and sharing experiences) has to be offered for the individuals. A multilayered model of knowledge creation has been suggested by Nonaka et al. (2001). It consists of three layers: 1) a SECI –process (socialization, externalization, combination, and internalization) see Figure 3 for more clarification, 2) ba as a platform for

knowledge creation, 3) knowledge assets and a moderator of a knowledge-creation process. The Ba – meaning a place - can be physical, virtual or mental, but it should always include interaction. The sharing of tacit knowledge begins in Ba (ibif.). The application of the knowledge creation model in the ICT-ESP is introduced in chapter 5.

## 2.5 Summary of the background for teams as an educational context

To conclude the pedagogical stance of the study, the learner is seen as an active agent rather than a passive receiver. The learning has to include real-life problems, and a combination of theory and practice. Knowledge is constructed in the interactions with other learners and new knowledge is created via interactions where doing and reflecting rotates. New explicit information from external sources has to be continuously searched for, studied and combined into the experiences gained from the practice.

### 3. The research framework and methodology

This chapter discusses epistemological and ontological issues, which are the philosophical underpinnings of any research. The chapter continues with a phase-to-phase description on how the study was carried out. The chapter concludes by providing an overall picture of how the study proceeded.

#### 3.1 Paradigm issues

Any research is always based on a certain vision or viewpoint of the world. The selection of research methodology, conducting the analysis and presenting the results are all choices, which reflect the researcher's viewpoint to the reality and interpretation of it. The ontology answers questions such as "what is the nature of the world we wish to study?", and epistemology answers questions like "what is knowledge?" and "what is the relationship between the inquirer and the world?" (Denzin and Lincoln 2005). The researcher also has to reflect his or her own values when doing research, and so axiology is also a part of the philosophical underpinnings.

When considering the questions raised above, the standpoint for this research is relativism. All human beings are culturally affected, and our interpretations and observations of the world depend on the cultural lenses we are wearing. These cultural lenses include the question of "what are the appropriate methods for conducting research?" According to Denzin and Lincoln (2005) there seems to be an emerging consensus that all inquiry reflects the standpoint of the inquirer, that all observation is theory laden, and that there is no possibility of theory-free knowledge. Knowledge (always connected to practice) is quite often separated from information, but in this chapter these two concepts are used as synonyms.

The selection of the research methodologies also has a direct effect on what kind of knowledge the researcher is able to get from the world he or she is investigating. According to Corbin and Straus (2008) the world is complex and there are no simple explanations for things. They argue that events are the result of multiple factors coming together and interacting in complex and often unanticipated way. When studying complex phenomena of the world, the researcher will benefit from using multiple methods (method triangulation). Denzin (2009) divides triangulation into four areas; data, investigator, theory, and methodological triangulation. Methodological triangulation is further divided into within-method and between-method triangulation.

Ontology answers the question of what kind of assumptions about the world one has. In this study, the explanations of relativism describe best the assumptions about the world the researcher has. Denzin and Lincoln's (2005) relativist ontologies suggest that there are multiple constructed realities. They argue that in relativism the epistemologies are interpretive, which means that the knower and known interact and shape one another. Based on that, all research is interpretative.

This study follows the constructivist paradigm, where the criterion of the research is based on trustworthiness, credibility, transferability, and confirmability (Denzin and Lincoln 2005). In the constructivist paradigm, the methodology used in the inquiry is hermeneutical / dialectical (Guba and Lincoln 1994), meaning that theory and empirical knowledge are in constant dialogue with each other. It is a constant conversation with the situation (Schön, 1983, 1987). Another epistemological starting point for the study was that knowledge is situation-specific and built together with the learners via interactions. So, the epistemological stance for the study is a combination of constructivism and socio-constructivism (Tyre and Hippel 1997; Wenger 1998, Wenger et al. 2002)

Axiology refers to role of values and ethics. The basic assumption of the researcher is that every research is value-laden and biased. By choosing to use qualitative methods for inquiry, the researcher has at the same time committed him or herself to continuous reflection of his or her one's own values and how they affect to the research. In practice the reflection in this study has been done by writing hundreds of different types of learning and reflection memos and having several hundreds of discussions where the researchers own value system has been put into test. The researcher's essential objective in this research has been to learn and understand more about team entrepreneurship, and team learning, and become a better team coach. Table 3 summarizes the background orientation and commitments of the study.

Table 3. The research framework and steps of action.

Philosophical underpinnings	<ul style="list-style-type: none"> <li>- Ontology: relativism</li> <li>- Epistemology: constructivism and socio-constructivism</li> </ul>
Research approach	<ul style="list-style-type: none"> <li>- Qualitative</li> </ul>
Research strategy	<ul style="list-style-type: none"> <li>- Action research</li> <li>- Case study</li> <li>- Grounded theory analysis</li> </ul>
Data collection	<ul style="list-style-type: none"> <li>- Theme-based interviews, including critical incident technology</li> <li>- Direct observation of team learning sessions</li> <li>- Participative observation and field notes as a team coach</li> <li>- Analysis of data in information repositories</li> </ul>
Data analysis	<ul style="list-style-type: none"> <li>- Grounded theory (theoretical sampling, constant comparative method)</li> <li>- Case study techniques (i.e. time-series analysis)</li> <li>- Social network analysis</li> </ul>

## 3.2 The research process

The preparation for the study started in the end of 2009. The first discussions about the new learning environment soon led to a visit to Tiimiakatemia in Jyväskylä and planning for the new learning environment for IT Bachelor education (upcoming ICT-ESP) started. The planning phase included recreation and making adjustments to the IT bachelor curriculum and preliminary agreements on the roles in carrying out the renewing of the IT Bachelor curriculum. The author made the decision to follow the development process of the renewing of the learning environment and to document and publish the development phases as a part of his PhD studies. The organization did not require a lot of special effort. The author had been part of the personnel of the IT Degree Programme from the very beginning - since 1996, so the context was already familiar. The organization structure and personnel within which the new learning environment was created were also familiar to the author. For these reasons it was relatively easy to start the preparations for the PhD study.

### 3.2.1 Selection of research methods

The study was carried out by using almost purely qualitative methods. Quantitative methods were used only to compare the progress of studies between students. This data is not included in this study.

The study followed the principles of action research (Herr and Anderson 2005; Stringer 2007; McNiff and Whitehead 2010) where the essential objective is to improve what is already happening. The role of the person who is traditionally called “the researcher” is in practice not that of an expert. In community-based action research the role is rather that of a resource person. He or she becomes a facilitator or consultant who acts as a catalyst to assist the stakeholders in defining their problems clearly and to support them as they work toward effective solutions to the issues that concern them (Stringer 2007).

Silverman (1993) has listed the phases of organizing observational research. These phases include: beginning the research, writing field notes, looking as well as listening, testing hypotheses, and making broader links. Silverman suggests that premature definition of the variables is dangerous in field research. Early operational definitions offer precision at the cost of deflecting attention away from the social processes through which the participants themselves assemble stable features of



their social world. This does not mean that the early stages of field research should be unguided. One way to assemble data is to begin with very general questions and utilize theoretical sampling to guide the data collection.

The researcher is from time to time present as an active agent and not as a passive observer. Participation with empathy is essential, but it is not sufficient. The researcher has to be also an observer, a supervisor and an activator (Kultalahti et al. 2005). The role of the researcher in the current study could be compared to that of the Deweyan inquirer, who actively tries to understand the situations and to change it. The transaction between the inquirer and the situation is continuing and inherently open-ended. Within such dialectic, there is, in Dewey's words, "no such thing as a final settlement". (Argyris and Schön, 1996, p. 31). The multiple roles of the researcher in conducting action research and searching for equilibrium between them could be compared to acting at the spiritual level all the time, and finding the balance between dynamics of intervening and withdrawing. The principles of action research and how they have been utilized in the study are described in Figure 4.

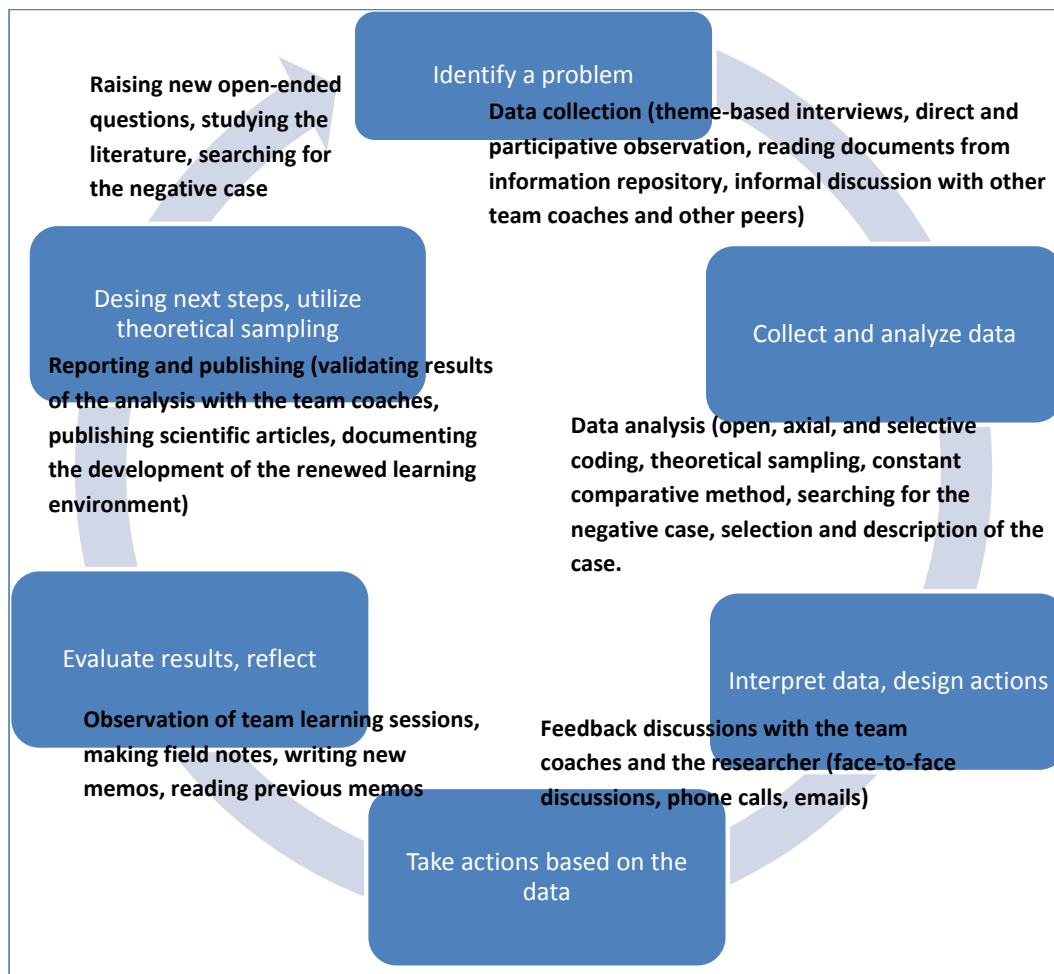


Figure 4. The principles of action research and how they have been utilized in the study.

### **Inductive approach**

McNiff, Lomax and Whitehead (1996) describe action researchers, unlike orthodox researchers, as ones who intent on describing, interpreting and explaining events while seeking to change them for better. They also claim that action research can lead to 1) researcher's own personal development 2) better professional practice 3) improvements in the institution in which the researcher works, and 4) making a valuable contribution to the good order of the society.

McNiff and Whitehead (2010) present some principles which every researcher conducting action research should be aware of before starting an action research project. These principles are: 1) be optimistic and realistic of what is possible to do, 2) be sensitive to the situation and develop a strategy of how to deal with different situations, 3) be flexible and stay focused, and 4) have faith in yourself and others.

Considering the authors project with team entrepreneurs, their team coaches and other personnel within the target organization the process was a huge learning journey. Optimism was sustained and realism of what is possible to achieve within the context and within the given timeframe, turned out to be the number one resource to go on with the study. The faith in the author's skills to carry out action research was reconsidered several times. After testing the method in action several times, the faith for competence in doing action research started strengthen.

Within the action research framework of the study the Grounded theory method (Glaser and Strauss 1967; Strauss and Corbin 1997; Glaser 1998, 1992; Corbin and Strauss 2008) was employed both in the data collection and the data analysis phases of the study. The Grounded theory method provides new insights into the understanding of social processes emerging from the context in which they occur, without forcing and adjusting the data to previous theoretical frameworks (Cassell and Symon 2004).

#### **3.2.2 Data collection**

The team entrepreneurs of the first IT cooperative Icaros, were interviewed three times, and the team entrepreneurs of the second IT cooperative Ideatech were interviewed twice. In case a team entrepreneur left the cooperative and changed his or her study path, an extra interview was conducted. These interviews were made between April 2010 and October 2012. All interviews were sound-recorded. The length of the interviews varied from 30 minutes to 110 minutes. During one of the interviews the digital recorder ran out of batteries, and the data was reduced to notes made by

the researcher during the interview. The interview themes are presented in appendices 1 – 4, and the total amount of the interviewees in the IT cooperatives is presented in Appendix 5.

The researcher also directly observed a total of 22 team learning sessions. Most of these team learning sessions were 4-hour sessions during which the team entrepreneurs shared information about their ongoing operations and designing future actions. Every now and then the researcher was asked on for his opinion, but usually the given answer was on purpose kept on general issues with no real informative content. In other words, the answer might include a question or a standard phrase such as “I believe you are able to decide how to solve this on your own”. When the questions were related the structures of the learning environment itself or administrative duties related to it, the questions were answered together with the team coach. However, the researcher’s role was considered participative rather than that of a direct observer.

The role of the interview data in the study was to collect authentic experiences of the interviewees. According to interactionism, interviewees are viewed as experiencing subjects who actively construct their social worlds; the primary issue is to generate data which give an authentic insight into people’s experiences; the main ways to achieve this are unstructured, open-ended interviews usually based upon prior, in-depth participant observation (Silverman 1993).

Social network analysis has been used as a data collection and analysis method in organization studies for a long time (Pfeffer 1997; Knoke 2008). Social network analysis makes it possible to visualize strong and weak communication links and find out the direction of communication. It can also help to analyze e.g. power balance in the team by visualizing issues such as who talks to whom, who is listened to, and who is not. The social network analysis was used to build a basic understanding of the baseline of team cohesiveness from the viewpoint of how the team entrepreneurs felt they knew each other, and to estimate the quantity of communication between the team members.

The data gathered via the theme-based interviews was utilized by direct and participative observation to be able to either validate them or to find contradictions in them. The combination of qualitative data collection methods required more resources but it also helped build a more coherent picture of “what was going on?” A summary of the collected data is presented in Table 4.

Table 4. Summary of the collected data.

<b>Data source</b>	<b>Description</b>	<b>Total</b>
Theme-based interviews	All team entrepreneurs were interviewed at least once. Members of one team were interviewed three times. Students who quitted from the cooperatives were also interviewed. Critical Incident Technique was utilized as part of the team-based interviews (Chell 2004).	39 theme-based interviews (between April 2010 – October 2012)
Participative observation	Team learning sessions were observed. The researcher acted as a passive participant listening, observing and making notes. Now and then the researcher’s opinion was asked for something, usually concerning some administrative issue.	22 team learning sessions were observed as a researcher (between April 2010 – May 2012)
Documents in Information repository	The team entrepreneurs’ progress in their studies was followed twice a year based on official information in the student information system (Winha).	April 2010 – May 2014
Social network analysis	Social network analysis was used to visualize strong and weak links in team’s dialogue. It also provided basic information for interpreting issues related to power within the team. The team entrepreneurs were asked to estimate how much they communicated with other team entrepreneurs within the team.	Amount of communication within one team was estimated.
Other sources of data	As a team coach, the researcher had annual development discussions with one team. With permission of the team members the interpretations made in these discussions were used as a data to understand the beginnings of the team entrepreneurs learning process. The researcher has collected field notes from 48 sessions as a team coach.	11 development discussions, 48 sessions as a team coach (between August 2012 – April 2014)

### 3.2.3 Data analysis

#### **Grounded Theory analysis**

The first phase of the data analysis was to transcribe the theme-based interviews and the field notes of direct and participant observation sessions to plain (ASCII) text with the Notepad text editor. After transcribing the texts were imported to the Atlas.ti program for analysis. Analysis of the collected data started almost immediately after the beginning of the data collection. In other words, during the study, the data collection, theoretical sampling, and data analysis were going on in parallel.

During the Grounded theory analysis, two instruments were very beneficial. The constant comparative method (Glaser 1965, 1969, 1978) was used to recognize new phenomena worth of studying. Klenke (2008) calls the Grounded theory method a comparative analysis methods, which would allow for the emergence of categories as an alternative to the hypothetico-deductive approach in social research. Theoretical sampling (Glaser 1978) was used to gather more data on phenomena which turned out to need more explanation before they were theoretically saturated. When theoretical sampling was used, the interesting phenomena were further studied by collecting more data concerning the phenomenon at hand from upcoming interviews, and later the metrics of the phenomenon were validated also via other data sources.

Grounded theory analysis (Glaser and Strauss 1967; Miles and Huberman 1994; Strauss and Corbin 1997; Symon and Cassell 1998; Corbin and Strauss 2008) consists of three main phases: *open coding*, *axial coding*, and *selective coding*. The Grounded theory method was already utilized in some previous studies, so it was a natural choice to continue with familiar methods which had turned out to be appropriate for the current study.

During the open coding phase the interview data is read through to find out interesting phenomena related to the current research question. Open coding starts usually with one seed category, in other words a topic of interest of the researcher based on preliminary understanding on what is going on in the data on the basis of the first few interviews. In the beginning the open codes are only some interesting parts of the data. Later on, when several interviews and/ or observations are made, these codes are revisited and their descriptions updated. Glaser (1965, 1969, 1978) calls this the constant comparative method. The theoretical codes to emerge gradually from the data.

When the axial coding phase is entered, the code families and open codes within them are rearranged. In the axial coding phase, nearly similar codes are merged and new code families may be established. The main idea in the axial coding phase is to find out how densely different phenomena exist in the data. It will also provide the researcher with information on what data is missing and how theoretical sampling should be utilized. In the axial coding phase, a lot of memos were written to reflect on how the phenomena in the data are associated to each other, what kind of causal relations there seems to exist and which phenomena are part of some other phenomenon. Finally, when the researcher believes that theoretical saturation is achieved and the core of the theory is starting to emerge it is time to go on to the selective coding phase (Glaser 1978; Corbin and Strauss 2008).

Theoretical saturation means a situation where an extra interview or observation made does not bring any significant new data (Glaser 1978; Corbin and Strauss 2008). During the selective coding phase the core of the study is formed and it is possible to start answering the “What is going on here?” question. An example of the beginning of the selective coding phase is presented in Figure 5.

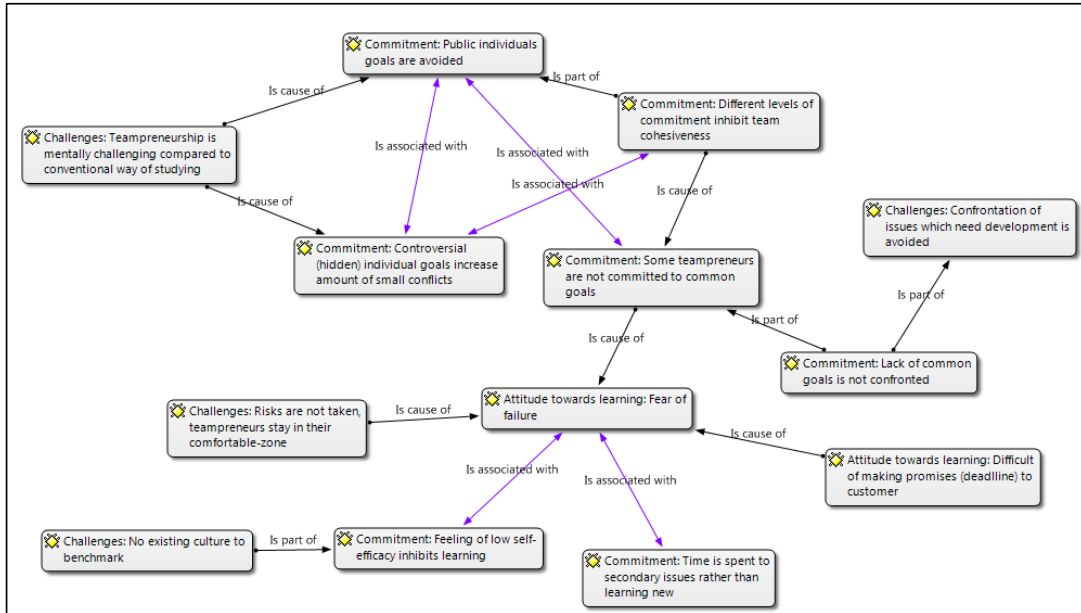


Figure 5. Example of selective coding and data reduction.

Searching for and reporting on negative cases affect the validity of the research (Patton 2002). During the analysis, theoretical sampling is deployed to study both possible negative cases and new emerging phenomena based on which new seed categories for open coding are established. The constant comparative method (Glaser 1965, 1969, 1978) is also utilized to test whether the analysis should be restarted to provide enough data for new categories, to guarantee theoretical saturation.

### Reporting on the studies

Yin (1993, 2003; Eisenhardt 1989; Eisenhardt and Graebner 2007) suggest utilizing several ways when reporting on research findings. During the present study, some results were written as case descriptions and published as position papers or as short articles in academic conferences.

### 3.2.4 Reflecting on the researchers role and the effect of bias

A researcher has to avoid bias in Grounded theory analysis by all means. It is vital to read and study from the outset of the research, but in unrelated fields. This maximizes the avoidance of preempting, preconceived concepts which may easily detract from the full freedom to generate concepts that fit and are relevant when coding and analyzing the data as it is collected (Glaser 1992,



1998). This view can be described as an extreme approach to dealing with researcher bias compared to other authors describing Grounded theory analysis. Based on the author's current understanding of the study, the former requirement is very orthodox, if not even naive, and it would probably be impossible to implement it in qualitative research in practice.

Corbin and Strauss (2008) also discuss bias but they are not so strict on what a researcher should or should not do to avoid bias. They concentrate more on *theoretical sensitivity* where the researcher should always follow the leads on the data he or she is collecting. By using this technique called theoretical sampling, the researcher is able to guide his or her study to understand the phenomena under investigation better. This view is supported by Denzin and Lincoln (2005), who argue that all observation is theory-laden and there is no possibility of theory-free knowledge. When doing qualitative action research, the researcher has to bear the dynamics of participation and withdrawal in mind. The researcher has to notice his or her role in every situation and be sensitive during the interviews, to be able to grasp the themes the interviewees are describing. The researcher is at times an active participant and at times a neutral observer (Kultalahti et al. 2005).

Nonaka and Toyama (2005) highlight that values, context and power always affect the studies made on human beings, and research concerning human beings, where humans are at the same time objects and subjects, cannot be free from subjective factors.

Klenke (2008, p. 12) presents the strengths of qualitative research, and at the same time expresses her view on the researcher's role in qualitative research as follows: "Instead of treating the researcher as an invisible other, a neutral instrument whose personal characteristics do not significantly shape the responses of research participants, the qualitative researcher's individual standpoint and its impact on the research are an integral part of the qualitative research process. Qualitative methods focus on the lived experience of the research participants and their critical voices. They become a source of empowerment that can be seen as reflecting alternative scientific paradigms by acknowledging reality as being filtered through local, historical, contextual, and multiple lenses instead of emphasizing the scientific objectivity and interpersonal detachment."

To avoid too much bias, the researcher can use techniques like flip-flop, waving a red flag, or looking for negative cases. In the flip-flop technique, the researcher asks him- or herself questions from opposite viewpoints to understand the interpretations and possible misjudgments (possibly based on bias) in the interpretations better. When waving a red flag the researcher reconsiders every expression which has a strong value like "taboo" or "never". Depending on the cultural background of the researcher, this kind of expressions may create bias to the analysis. The negative case

technique means that the researcher tries to find a negative case which would provide an alternative explanation. (Corbin and Strauss 2008).

After studying two often cited and partly conflicting views (Glaser vs. Strauss and Corbin, and several others) of doing qualitative inquiry with Grounded theory as the method of analysis an older source for discussing bias was also studied. Maslow (1970, p. 3) argues that the researcher should not be too worried about bias because “usually there is no single primary all-important motivation. Rather there is a combination of varying amounts of all-important motivations working simultaneously.” Maslow continues by presenting that in science there is overstress on technique over questions asked and problems (for studying) suggested. Overstress limits the questions asked and problems suggested and will also limit the development of new technologies. Maslow concludes that “one major problem in science is the goal to be as objective as possible.” ... “Using only methodological criteria the most trivial research could demand as much respect as the most fruitful one” (op. cit., pp. 15-18).

A certain level of bias will always be present in any study. Rather than avoiding bias, it is more important to admit that it is present and now and then stop to reflect where it may affect the results and reconsider those parts of the analysis. Furthermore, when doing research within a community of specialists, another source of bias is the colleagues the researcher is working with. From one viewpoint they may help to validate interpretations made from the data and even offer possibilities for researcher triangulation. From another viewpoint the colleagues also have their personal set of varying all-important motivations related to study. These will include conscious and unconscious biases. Within any specialist organization, organizational politics may also be present when decisions concerning the utilization of results of the studies are made. These sources of bias have to be noted and considered as well when analyzing and reporting on the results of the study.

To conclude, the version of Corbin and Strauss (2008) follows the original statement made by Glaser and Strauss (1967) where they suggested using Grounded theory (remarkable part of qualitative methods) strategies flexibly in one’s own way (Mielonen 2011). After re-considering the discussion about the bias presented here and its effect on the researcher’s motivation and value basis, a decision to continue with the Corbin and Strauss version of the Grounded theory method was made.

### 3.2.5 Summary of the research process

The current study has followed the action research (Stringer 2007; Herr and Anderson 2005) framework. The collected qualitative data have been analyzed with methods based on Grounded theory (Glaser and Strauss 1967; Glaser 1992, 1998; Strauss and Corbin 1997; Corbin and Strauss 2008). The reporting has followed the guidelines on Grounded theory and case study (Yin 1993, 2003; Eisenhardt 1989; Eisenhardt and Graebner 2007). The main phases of the research process are represented in Figure 6.

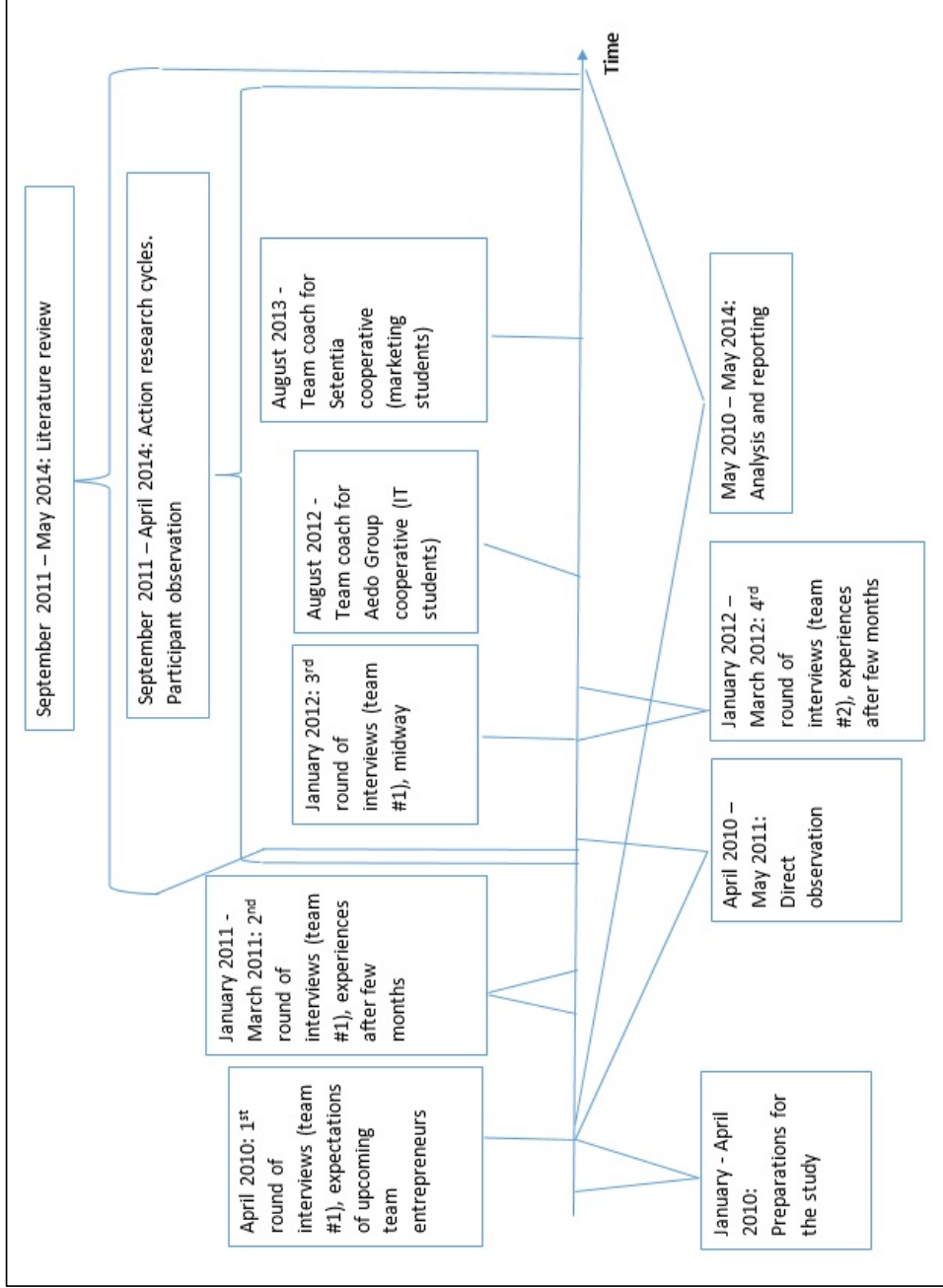


Figure 6. The main phases of the research.

## 4. Summary of the original papers

### 4.1 Development of the learning environment – the trajectory

The preparation for the PhD study started actually in 2005 during the Katapultti –project, carried out in cooperation with South Carelia Polytechnic (presently Saimaa University of Applied Sciences) and Lappeenranta University of Technology.

The first research interests were related to the challenges which mostly small and middle-sized ICT companies (SMEs) working with global forest industry enterprising were facing in the rapidly changing context of globalization. When comparing business processes, technologies and types of customer relationships three different types of companies: anticipator, specializer, and collector were identified (Smolander et al. 2009). The anticipator type companies worked proactively with their customers to create new business opportunities. The specializers concentrated on one or two technologies and had deep knowledge in them. The collectors offered a large scale of services to many customers. Due to outsourcing, mergers and off-shore software development, local SMEs found the situation very challenging to cope with.

The first study was followed with a study where Finnish information system development (ISD) companies that were increasing their subcontracting and outsourcing of software development were studied (Juvonen 2009). The driving factors supporting outsourcing decisions and the suppressing factors preventing them were analyzed in the study. The results showed that factors fostering outsourcing concerned diminishing software development costs, need for special competencies, concentrating on core competencies, and access to a resource pool. Respectively the suppressing factors were: language barriers, huge amount of documentation written in Finnish, subcontractors' lack of domain knowledge, current state of the company's ISD practices, and fear of outsourcing the company's knowledge. In addition, it was felt that certain competencies were easier and more cost-effective to buy from subcontractors than to start to develop them in-house.

The findings described above helped the author to decide what would be the next step in the studies. After realizing that in several companies the needed competencies were rather purchased from subcontractors as services than developed in-house, the author started to wonder what this meant from the learning perspective of the company, and what effects the situation could have on IT Bachelor education. Furthermore, did it mean that some companies did not want to challenge themselves for lifelong learning or did they possibly lack skills of meta-level learning? Was it all

just a consequence of short-term business thinking, where the result of the next quarter is emphasized regardless of lack of long-term development? What would it mean for IT Bachelor education if specific competencies were bought as services from subcontractors? These questions led the author to study more closely how the learning within the ISD companies actually took place. For this study (Juvonen and Ovaska 2009), the findings of studies on organizational learning from several different disciplines were carefully analyzed and then used as lenses to gain more understanding on what kind of practices were used in ISD companies

The viewpoints of other disciplines such as pedagogics, organizational science, knowledge management, organizational learning and learning organization helped the author to realize that several domains were struggling with quite similar challenges, e.g. how do deal with the increasing speed of change, how to be able to learn rapidly enough on multiple levels (individual, group, organizational) to cope with the change, how to build proper learning environments and support structures to nurture the creativity and innovativeness of individuals, and how to inspire individuals to meet the vision and fulfill the mission of the organization where they work. It was also found (Juvonen and Ovaska 2009) that a lot of unsystematic and unintentional learning took place within at group level in the target companies of the research. The situation was the same in Finland and Ireland. The rapidly changing context and continuous changes in the organization structure made group-level learning very challenging because working groups very easily broken and the employees were in many cases forced to use canonical practices in their work. These issues were felt to hinder motivation, commitment and innovativeness.

After the initial studies, a lot of incremental changes were made to the curricula of the IT Bachelor education at Saimaa University of Applied Sciences. Lots of discussions on how to make IT Bachelor education more practical and relevant compared to results received in the previous studies took place. The radical renewing of the IT Bachelor education was yet to come. The last two of the original papers presented here described the first steps of the renewed IT Bachelor education (ICT-ESP), which started in 2009. First, the objectives and general level organization for the created learning environment were presented (Juvonen 2012) and then the first experiences of studying within the ICT-ESP were discussed (Juvonen 2013). An overview of the renewed curriculum for IT Bachelor education is presented in Figure 7.

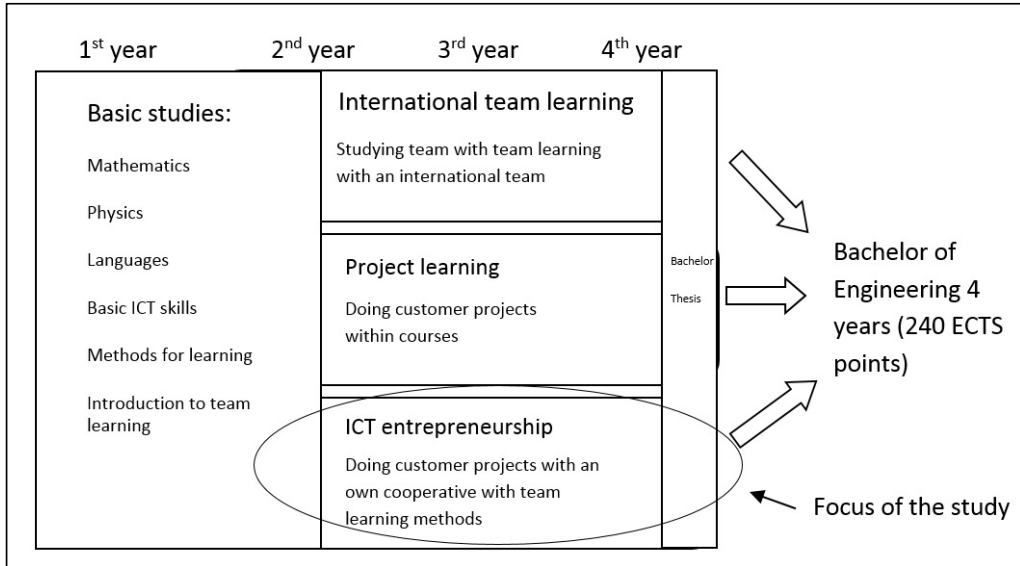


Figure 7. The new IT bachelor education (Juvonen and Ovaska 2012).

**International team learning study path:** Those IT students who selected to study in English and by doing customer projects with foreign students chose international team learning for their study path. These customer projects were supervised by teachers and company representatives in cooperation.

**Project learning study path:** Those IT students who chose to continue their studies on the project learning study path enrolled to some conventional courses on IT. They also participated in several courses where customer projects were carried out within the courses. The goals of the projects were agreed on together with the customer organizations, and the learning objectives were agreed on with a tutoring teacher.

The leading ideas behind the renewed learning environment (Figure 7) were based on recognizing that changes are so quick that it is not feasible to emphasize single technologies in IT Bachelor education. Rather than single technologies, future IT Bachelors would need a different set of skills. This did not mean that understanding technologies would not be needed at all, but a change of the abstraction level in learning was suggested. The competencies needed in the current world in ICT education emphasize e.g. skills of learning new things rapidly (meta-learning skills), innovativeness, entrepreneurship skills, project management skills, team working skills, intercultural skills, and an ability to reflect on one's own attitude and values. This view was supported by several studies, some of which were listed in the introduction of the current study (see Table 2 for more examples).

Finally, the last original paper (Juvonen 2013) presented the very first experiences of the first IT cooperative, Icaros. The objective of the study was to find out a) how the team entrepreneurs felt in the very beginning of their journey as team entrepreneurs, and b) how the situation appeared to the observer. The results showed that Icaros faced with several parallel challenges. The team entrepreneurs were avoiding confrontation and conflict which seemed to prevent them from maturing as a team. A summary of the contents of the original papers is presented in Table 5.



Table 5. The summary of the contents of the original papers.

<b>Contextual factors</b>	<b>Description of the themes included in the paper</b>	<b>Paper</b>
ICT sector and change	Moving up in the value chain, low-skill jobs will disappear in the Western world.	Smolander, K., Ovaska, P. and Juvonen, P. (2009). The challenges for small software firms in industry globalization, <i>International Journal of Globalization and Small Business (IJGSB)</i> , Vol. 3, No. 1, pp.73–89.
ICT sector and change	Rapid change requires rapid learning or subcontracting to get things done.	Juvonen, P. (2009). Evaluating the Driving Factors and the Suppressing Factors Related to IS Outsourcing in Four Finnish Information Systems Organizations. Presented in ISD (Information Systems Development) conference in Galway, Ireland on 29th of August 2007, In C. Barry, K. Conboy, M. Lang, G. Wojtkowski & W. Wojtkowski (Eds.): <i>Information Systems Development. Challenges in Practice, Theory, and Education</i> . Vol. 2, Springer, United States of America, pp. 687 – 698.
Changes in needs for ICT education	New types of competencies, and learning environments for developing them.	Juvonen, P. and Ovaska, P. (2009). Organizational Learning literature visited – Fresh lenses to study practices in ISD organizations? Conference article presented in ISD (Information Systems Development) conference Cyprus on 26th of August 2008, In G. A. Papadopoulos, G. Wojtkowski, W. Wojtkowski, S. Wrycza & J. Zupancic (Eds.): <i>Information Systems Development. Towards a Service Provision Society</i> , Springer, United States of America, pp. 569 – 577.
Changes in needs for ICT education	New types of competencies, and learning environments for developing them.	Juvonen, P. (2012). Fostering Entrepreneurship by Developing a New Learning Environment Within a Finnish University of Applied Sciences, In T. Burger-Helmchen (Ed.): <i>Entrepreneurship – Born – Made and Educated</i> , ISBN 979-953-51-0210-6. InTech, Printed in Croatia, pp. 225 – 246.
Change in learning methods and in educators' role	From teaching to team coaching and learner-centric methods. Team development.	Juvonen, P. (2013). Learning to fly? First experiences on team learning of Icaros cooperative. <i>European Journal of Engineering Education (EJEE)</i> Vol. 38, No 2, pp. 186-193.

## 5. Results

### 5.1 Methods and tools for learning in ICT-ESP

The practice-level starting point for the modelling of the ICT-ESP was based on the team entrepreneurship and team learning model used by Tiimiakatemia (Tiimiakatemia). In practice the realization of any model is always a complex structure combining the experiences, beliefs and values of the individuals who execute the model. The ICT-ESP was organized as follows:

1. Students who chose the ICT-ESP established a cooperative together during the spring semester of the first academic year. These students were called team entrepreneurs
2. A team coach responsible for the coaching of the team was nominated. The team coach started the coaching process with a course called “Team learning”, where the most essential learning methods used in the ICT-ESP were introduced
3. In the beginning of the second academic year, a management board (see appendix 5 for more) for the cooperative was chosen. The management board cooperated with the team coach in designing tryouts and how the operations of the cooperative were organized.

To organize the ICT-ESP and to support the learning of the team entrepreneurs, the relevant literature was studied to be able to adjust and implement the needed learning methods and management structures in practice. A short summary of the relevant literature was presented in in table 2 (p. 12). The body of knowledge listed in the table 2 and how it was utilized in the ICT-ESP are presented and discussed in the following chapters.

### **Essential methods for learning – trainings, books and customer projects**

*Tryouts* were team learning sessions where the team entrepreneurs shared and reflected on what they had learnt from reading books (theory) and from the customer project they had been doing. These tryouts were held twice a week and they usually lasted from three to four hours. Every now and then the team learning sessions lasted for eight hours or more. Some of the tryouts stimulated divergent thinking - idea generation or innovation supported with appropriate methods - and some tryouts were places for crystallization, making concepts, or defining action plans. *Dialogue* (Bohm 1996; Isaacs 1999; Jacob and Heracleuos 2005) was an essential tool for sharing information in the tryouts.

#### **Generative dialogue**

The word dialogue comes from two Greek roots, dia and logos, suggesting “meaning flowing through”. Dialogue can be defined as a sustained collective inquiry into the processes, assumptions, and certainties that compose everyday experience (Isaacs 1993). In a dialogue, nobody tries to win (Bohm 1996). Dialogue involves learning about the context and the nature of the processes by which people form their paradigms, and take action. (Isaacs 1993; Grill et al. 2011). Dialogue is a living experience of inquiry within and between people (Isaacs 1999). Generative dialogue emerges when people let go of their positions and views and simply attend to the flow of conversation (ibid.). True dialogue is achieved when the participants are able to create new meaning and think together. Sharing knowledge through dialogue can also be seen as a dimension of non-defensive behavior promoting learning (Argyris and Schön 1996). Dialogue skills develop through practice and reflection. A lot of patience will be needed during the development process (Isaacs 1999).

The basic rules of dialogue (speaking in one’s own voice, listening, respect, and suspending judgment) were introduced to the team entrepreneurs during the tryouts. The emphasis on the dialogue rules and the amount of intervention when the rules were violated varied a lot, depending on the team coach. The author found himself to be an active coach in the sense of intervening with the dialogue when needed. The basic rules of dialogue had an important role in building trust within the team. When the team entrepreneurs behaved in a trustworthy manner – showing respect, listening without judgment - towards each other the quality of the dialogue started to improve.

Generative dialogue was typically employed when the team had a new challenge (e.g. marketing or productization) ahead. The tryout was then usually organized in three to five sections, depending on

the challenge ahead. First, a general dialogue about the topic and the objectives was carried out as a single group. Second, there was either time for individual idea generation or the team was divided into three to five groups (or pairs) for small-group discussions. Sometimes the objective was the same for all the groups but sometimes the objectives were different. After working in parallel, the ideas were presented to the whole group and developed further. Depending on the task at hand innovation tools were utilized. A versatile set of innovation tools (see the list of literature to study on the topic in Tables 2 and 5) were available all time and they were utilized when needed. Sometimes slightly unusual innovation methods such as drama playing, speed-dating with other teams and playing sports with the team were also used to foster lateral thinking and generate new ideas and topics for the dialogue.

Another typical use of generative dialogue was book dialogues. The book dialogues were a special type of tryouts where books read by the team entrepreneurs were discussed. Usually the book dialogues included presentation of the book, individual learning experiences, and discussion on how the peers and the team enterprise could utilize the information. A lot of open-ended questions were raised during the book dialogues and they fostered the transfer of learning from the books (theory) into the context of the team enterprise.

### **Reflective dialogue**

Generative dialogue is divergent by nature. Reflective dialogue is convergent and concluding. Reflection brings to the surface – in the safe presence of trusting peers – the social, political and emotional data that arise from direct experience with others (Boud et al 2006).

Embodied and mind actions are only loosely connected. In the body-to-mind direction, we cannot put into language much of what we feel in our bodies, which often called tacit knowledge (Polyani and Kegan 1996; Nonaka and Takeuchi 1995) and practices (Spinosa et al. 1997) or explicit knowledge (Nonaka and Takeuchi 1995). We often find ourselves utterly unable to explain how we do our skillful actions. Using dialogue as a team learning method helps the team members to articulate what they have been experiencing and what others should do to develop similar competencies. Genuine dialogue can happen when three conditions are fulfilled: equality and the absence of coercive influences; listening with empathy; and bringing assumptions into the open (Yankelovich 1999). Higher levels of learning generally require the ability of acting to surface individual and collectively held assumptions of “theories of action” (Argyris and Schön 1978), step outside them and interrogate them critically. Such activities are central features of reflection.

The importance of reflection on what has been learnt has been noticed by several authors (Kolb 1984; Nonaka and Takeuchi 1995; Argyris and Schön 1996; Boud et al. 2006; Marquardt 2009). The role of reflection turned out to be crucial in the learning of the team entrepreneurs. Getting used to openly reflecting on the previous experiences openly was one of the biggest learning experiences for many team entrepreneurs.

The reflective dialogue in the ICT-ESP was in the beginning of the coaching process usually led by the team coach. Questions such as: “What did you learn from doing that?”, “How would you do differently if you started over?”, and “What should be not done in the next projects?” taught the team entrepreneurs the basics of reflective thinking. Usually the results of the previous reflective dialogues were utilized when making the action plans and setting goals for the upcoming projects. Most of the team entrepreneurs in the ICT-ESP made notes during the tryouts so the results of previous reflective dialogues were easily accessible.

During the second year in the ICT-ESP, the reflective dialogue started to appear into the tryouts without the team coach’s intervention. When new actions were planned in tryouts, they usually included reflection on what experiences the team already had on the subject and how the experiences should be utilized in the upcoming projects. There were differences in the amount of reflective dialogue between the teams. Some teams were not very eager to reflect on their past actions at all.

#### **The knowledge creation approach of the study**

The knowledge creation approach in the ICT-ESP is based on three essential principles: 1) new information has to be studied from external sources such as books, web pages, and videos, 2) the learned theories, models, and body of knowledge have to be applied into practice in customer projects, and 3) the experiences gained from customer projects have to be shared with the team members in tryouts and reflected upon to guarantee team and organizational level improvement.

The tryouts performed twice a week with the team entrepreneurs and the team enterprise’s office where the team entrepreneurs worked together with their customer projects served as the primary context for knowledge sharing (socialization, externalization). Team meetings and board meetings served as the secondary context. The spreading of knowledge about the ongoing customer projects and other relevant topics within the team enterprise did not happen automatically in the beginning. It needed active questioning and predefined practices from the team coach. When the team entrepreneurs got used to the team coaches’ questions related to customer projects and general

topics concerning the team enterprise, they started to ask these questions themselves and the knowledge sharing became easier. There were differences in the knowledge sharing practices between the teams, meaning that some teams were guided actively to share knowledge and others were not. The decision on how to build the knowledge sharing practices was up to the team coach.

Studying theory by reading books (internalization) was found to be much more challenging than the team coaches expected. Many team entrepreneurs expressed that before they started to study in the ICT-ESP they had read about five books during their life. Starting to study theory from books was not easy, and instructions on reading techniques and how to write essays on the basis of books were discussed many times in the tryouts. Some of the team entrepreneurs challenged themselves to find interesting books and learned a lot, while others more or less tried to avoid the reading as long as possible. This raised new challenges for the team coach, because there were certain topics such as guerilla marketing, sales, and productization, where a similar level of background information would have fostered development.

It took several months before most of the team entrepreneurs studying in the ICT-ESP truly found out how they were performing. Even though every team had set their objectives and measures for the next half a year and year, they were not very eager to follow the progress on them. Actually the importance of shared goals, their measures, and how to pursue them was the biggest source of contradictions within the studied teams. The discussions usually led to other topics, such as the level of individual commitment, motivation and attitude, and the balance of individual freedom vs. responsibility of one's actions.

On the basis of the observations the hardest part of utilizing the SECI process in the ICT-ESP was writing about the lessons learnt to be able to utilize the information later (combination). Even though most of the team entrepreneurs in the ICT-ESP made notes during the tryouts which helped them to reflect on what had been learnt transferring the "lessons learnt" or "best practices" into information systems was challenging and the practices took time to emerge. Finally, when the practices started to emerge during the second year in the ICT-ESP (the author's team) the team entrepreneurs expressed that the stored information had not been much accessed. So, the combination part of the SECI – process mostly took place in the tryouts.

Organizations using 360-degree feedback (Greenberg and Baron 2008) as a part of assessment state that multi-source assessments are perceived as more fair, accurate, credible, valuable, and motivational than single-source evaluations. Thus, not only does 360-degree feedback enable the management to make higher-quality decisions about evaluated performance, it also increases the

acceptance of decisions by those being evaluated (Lepsinger and Lucia 2009). The 360 – review was utilized in customer projects to provide multiple viewpoints for the assessment. An overview of the methods and tools used in learning in the ICT-ESP compared to the experiential learning cycle is given in Figure 8.

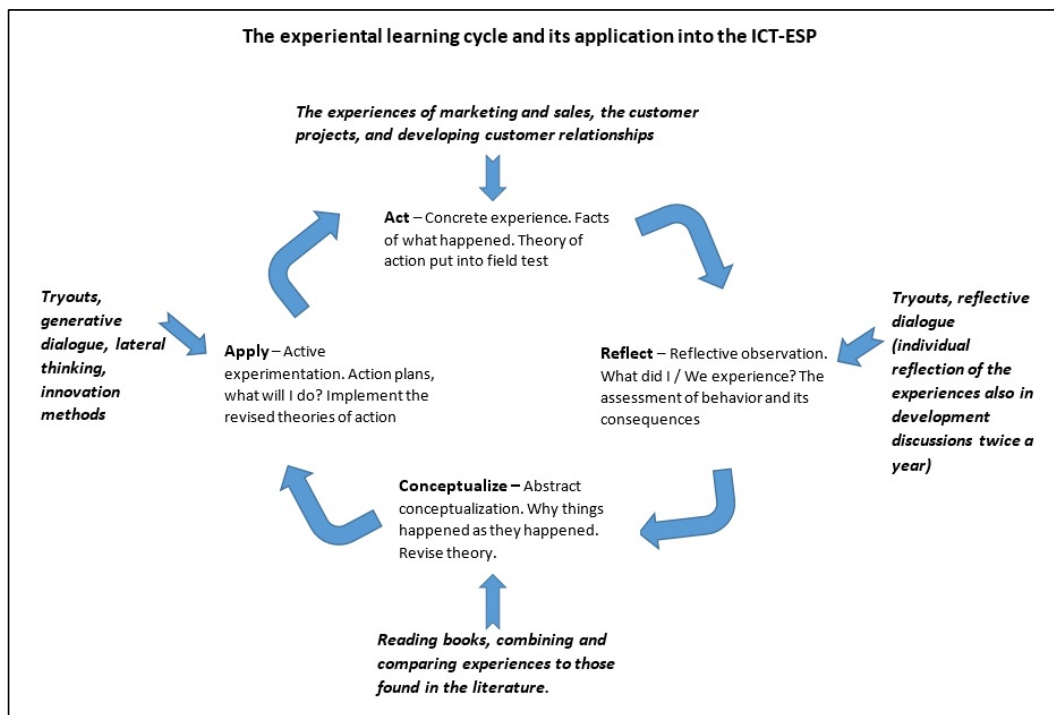


Figure 8. Overview of the methods used in learning within the ICT-ESP.



## 5.2 Team entrepreneurs' perceptions on ICT-ESP

To present how the students who studied as team entrepreneurs within the ICT-ESP perceived their study path in, the interview data was analyzed once again with this in mind. Some examples of the interviews concerning the pros and cons of the ICT-ESP based on the expressions of the team entrepreneurs are presented in tables 6 - 9.

Table 6. Some pros and cons concerning the ICT-ESP expressed by the interviewees.

<b>Topic: Attitude</b>	<b>Q: Where do you get energy?</b>
First year team entrepreneur #2, Team 1, February 2011.	"From faith; I see now clearer the possibilities of this study path. If you are ready to commit yourself, you can do anything you want. Nowadays everything connects to IT."
First year team entrepreneur #4, Team 1, February 2011.	"From positive pressure to achieve coming from teammates."
<b>Topic: Team development</b>	<b>Q: Could you describe how cooperation with your teammates is going?</b>
Second year team entrepreneur #1, Team 2, January 2012.	"This study path is mentally very tough. You have to stand your teammates day after day whether you like it or not. If someone lacks commitment, there is no much you can do about it"
Second year team entrepreneur #2, Team 2, January 2012.	"This first year is more like adaptation. Some may have not yet realized what it means that we are working in a company."
First year team entrepreneur #6, Team 1, February 2011	"I hope that in a year from now [xxxxx] would be a real team and those who are not team players might have left. We would have mutual goals and objectives which we would want to achieve."
<b>Topic: Performance goals</b>	<b>Q: Is there anything else you would like to discuss?</b>
Second year team entrepreneur #1, Team 1, January 2012	"Most of us know where the problems are and that there are clear excuses why we haven't done anything about them. Most of us know what's wrong but are they able to shape up to do the hard work..."
First year team entrepreneur #5, Team 1, February 2011.	"Sometimes I am a little worried about whether there will be enough enthusiasm to develop the know-how. It is easy to imagine that we learn something and then be satisfied to practice it."

Table 7. Some frustration concerning teamwork expressed by the team entrepreneurs.

<b>Topic: Frustrations</b>	<i>Q: What about the other side of the coin, is there anything that is not going as you would hope?</i>
First year team entrepreneur #1, Team 1, February 2011.	”Some team entrepreneurs are not committing themselves much. They do if they are asked to do something but they do not take any initiative.” “... We have been discussing about commitment a lot, but ... actions are still missing. It doesn’t bother me much but I know there are team entrepreneurs whose motivation will decrease because of lack of others’ commitment.”
First year team entrepreneur #4, Team 1, March 2011.	“Sometimes it is frustrating to discuss small details for half an hour or even an hour. Minor issues could be solved quickly and then we could continue our projects.”
First year team entrepreneur #3, Team 1, February 2011.	“Some team entrepreneurs don’t spend time at the office, so cooperation with them on projects is challenging”.
First year team entrepreneur #5, Team 1, February 2011.	“The level of commitment is bad. Agreements are not kept.”

Although the comments concerning cooperation and commitment presented in Tables 6 and 7 are quite negative, and the different levels of commitment were a remarkable challenge for most of the teams, there are still some contextual factors that have to be considered before making final interpretations. First, most of the team entrepreneurs were young 20 to 25 years old with not much experience in working together as a group. The phenomena concerning group dynamics were totally new for most of the team entrepreneurs and some of the normal disagreements concerning the team development process between the team members may have been experienced stronger than a group of more experienced individuals would. Anyone can imagine himself / herself in a situation where one would start to do business with a group of people when you were 22 years old, and wonder how mature conflict resolution approaches one might have had.

Secondly, most of the team entrepreneurs were used to pedagogics where individual performance measured by tests was emphasized. Such practices as mutual goals and asking and giving help were not familiar to them in advance, and it took lot a of practice to get used to the new practices. Some of the team entrepreneurs took up the challenge, but some did not and decided to leave the ICT-

ESP. Some decisions to leave the ICT-ESP were based on the emphasis of individual goals in relation to team goals.

Table 8. Team entrepreneurs' expressions on the responsibility of an individual's learning process.

<b>Topic: Responsibility for the learning process</b>	<i>Q: What do you think about studying on the ICT entrepreneurship study path?</i>
First year team entrepreneur #1, Team 1, February 2011.	"If you waste your time and don't learn, it is like shooting into your own leg. After three years you may even graduate but you don't get along in the future anyway."
First year team entrepreneur #5, Team 1, February 2011.	"It feels odd to sit down for an hour and learn what the teacher says. I am already used to learning at my own pace. In a way the conventional way feels a bit old-fashioned. I have struggled to take a neutral stand to the traditions."
Second year team entrepreneur #4, Team 1, January 2012	"It is a pity that some team members have left, but it's not so important. If there are problems with motivation it is better to leave than to stay."
Second year team entrepreneur #1, Team 1, January 2012	"There are some team entrepreneurs whose lack of commitment makes me wonder, how they could commit themselves better. If you don't want to learn new topics, it's a bad basis for this. They should take the initiative."

Table 9. Expressions of team entrepreneurs who decided to leave the ICT-ESP.

<b>Topic: Feedback from team entrepreneurs who decided to leave from the ICT-ESP</b>	<i>Q1: Would you like to give feedback about the general arrangements of the ICT-ESP? Q2: Are there any other issues you would like to discuss?</i>
First year team entrepreneur #6, year 2010	“...The team building exercises were too odd for me, I am not the kind of person who likes to share much information about myself” “...We would have needed more support in building the daily operations.” “...I have heard that it has been very hard to find customers.” “...It should be told beforehand what it will be like, how much work it will require.”
Second year team entrepreneur #7, year 2011	“... I am a little bit afraid of how I can motivate myself to study in the conventional way again.” “...I had not enough time to continue as a team entrepreneur.” “...Many individuals were surprised at how much effort the ICT-ESP required”
Second year team entrepreneur #5, year 2011	“...there was not enough leadership present. I also lacked motivation.” “...Having a summer holiday away from the cooperative was a big mistake, we had to start with nothing in the Autumn” “...I am quite critical about the amount of reading in the ICT-ESP, I do not see any reason to reading so much.”
Second year team entrepreneur #2, year 2011	“...There should have been more leadership.” “I felt that there was not enough progress with my studies.” “We should have worked during the summer.”
Second year team entrepreneur #8, year 2011	”...Maybe it was challenging to require discipline from other team members because we were friends“ “We lacked communication, it was hard to operate when you had to dig information from others all the time.” “I found that this way of learning was not for me”

According to the team entrepreneurs who decided to leave the ICT-ESP there was lack of discipline within the teams. Some of the team entrepreneurs expressed frustration for lack of commitment and lack of communication. It was also expressed that more support on the leadership of daily operations would have been needed. When these expressions were compared to the observation

notes made with other teams, the topics were mostly the same. Those who felt committed to the common goals, felt frustrated because they saw that others were not committed.

Most of the teams expressed their wish to have an external leader or manager who would force the team entrepreneurs to act. The author's interpretation of this was that the individual responsibility to learn and develop would have been eagerly transferred to the team coach. When the team coach avoided taking the responsibility of forcing the team entrepreneurs to do something, it usually caused frustration among team members. From the viewpoint of the team coaching process and the pedagogics used in the ICT-ESP, this single issue was very important.

### 5.3 Perceived challenges in using the ICT-ESP

This chapter begins by representing the knowledge and skills needed in the ICT-ESP (see Figure 9). Next, the challenging role of a team entrepreneur is discussed, and the versatile role of the team coach is discussed. The chapter concludes with a comparison of teams found in the literature and the teams in the current study.

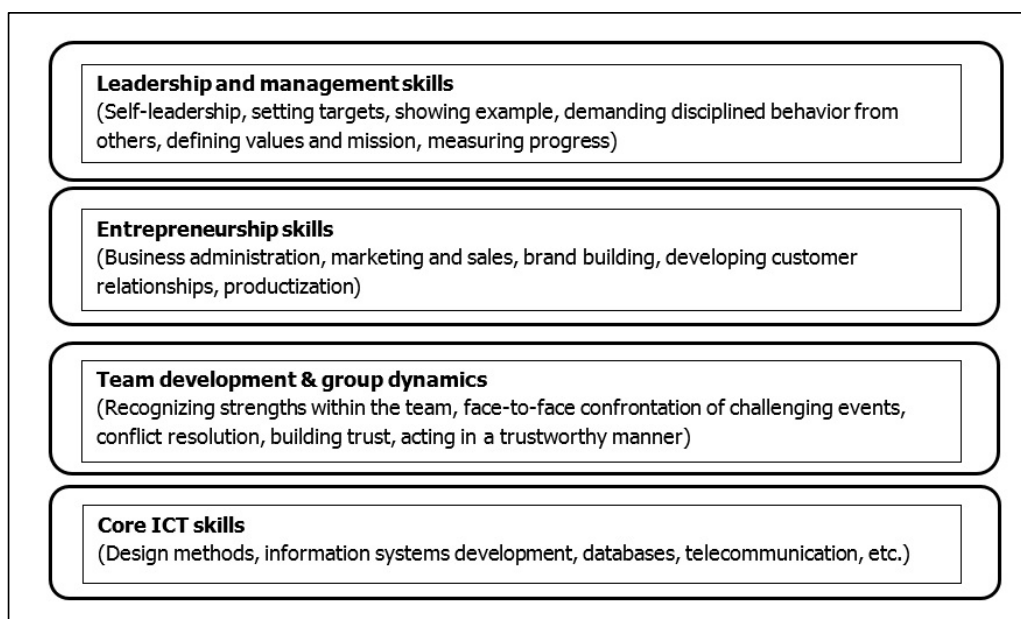


Figure 9. An overview of the knowledge and skills needed in the ICT-ESP.

### 5.3.1 The challenging role of a team entrepreneur

In parallel with the versatile challenges concerning ICT entrepreneurship, the team entrepreneurs faced also challenges related to conventional courses they would enroll in. During their first and second academic years the team entrepreneurs studied mathematics, languages, and physics. Arrangements like this mean that there were two parallel paths which the team entrepreneurs had to follow during their studies.

First path was the conventional path as an IT student participating in courses where the objectives of and methods for learning were in most cases decided by the lecturer of the course. The second path was the ICT-ESP where team entrepreneurs were encouraged to adopt meta-level thinking, making decisions on their learning targets and finding learning methods most appropriate to themselves. In addition, the team entrepreneurs were encouraged to self-leadership and taking responsibility for their common goals. These two paths, which were partly opposite, also called structural traps (Isaacs 1999), made the ICT-ESP very challenging to follow. Playing the game with two different sets of rules suggesting and emphasizing different issues is very challenging for anyone.

An essential point when analyzing the data related to the challenges the students faced was how single students perceived the situation. Even though the creators of the learning environment may have thought about how things were organized – the only way to find out how they worked in practice was to discuss them with the users who live within the learning environment and to observe what was happening.

The team entrepreneurs expressed several times the challenges they met with reading books. The challenge was said to be related to lack of routine with reading, challenges in concentrating due to many other issues going on in parallel (e.g. smart phones with social media applications, television, music, and games) which they were used to operating with, and which made it hard to concentrate on single issues such as reading. Furthermore, some of the team entrepreneurs found it hard to select books that were interesting enough. These challenges were discussed in the tryouts and action plans to improve the situation were made several times. For some of the team entrepreneurs it was enough to make the issues visible by discussing them while others needed to schedule their time for reading and writing essays and the challenges concerning reading still existed.

Considering the team coaching process (with the author's two teams), support for reading and writing essays was offered several times by defining fruitful circumstances for reading, discussing how to read and how to make notes, suggesting high quality books, and giving examples on how to write essays. The individual learning process (which included studying theory from the books) and arranging enough time to make it happen was however the team entrepreneurs' responsibility. No one can learn on someone else's behalf. When the individual learning process was "alive" the team coach would give all the possible support to it. If it was not, the discussions would turn into how make it alive.

### **Challenges with team development**

A team coach does not operate like a traditional teacher is usually seen and expected to operate. Instead of transferring information to the team entrepreneurs, the emphasis in the team coach's work is rather on helping the process of team development and facilitation of the learning information and skills the team members need for their collaboration and learning. A good representation of the essential teamwork competencies and skills is given by Levi (2007). These teamwork skills and competencies include: adaptability, shared situational awareness, performance monitoring and feedback, leadership and team management, interpersonal relations, coordination, communication, and decision making.

The five dysfunctions of a team (Lencioni 2012): absence of trust, fear of conflict, lack of commitment, avoidance of accountability and inattention to results are present during the team development process with every team. The team coach has to keep the facts on the table when needed even when it causes frustrations and anxiety among the team members.

Team development is an essential process and a platform-level building block for successful teamwork (Katzenbach and Smith 1993, 2001; Clutterbuck 2007). During the four-year period of the present study, the description of the teams for the study was written on the basis tens of theme interviews, direct and participative observation sessions, acting as an active agent (and as a team coach) for change, and hundreds of unofficial discussions with other team coaches and team entrepreneurs. A summary of the results is presented in table 10.



Table 10. Teams described in literature compared to the teams in the context of the study.

<b>Teams described in the literature</b>	<b>Teams in this study</b>
Members are selected at first hand based on their expertise, and secondarily based on their personality, team role etc.	Students selected on the basis whether they wanted to become team members and to establish a cooperative with other students who were going to make the same choice. Previous friendships had a strong influence during the selection process.
Goals and objectives are shared, individual and team objectives are in balance.	Individual objectives easily overruled the team objectives.
Commitment to the team's tasks is usually strong	Commitment to the team's task varied depending on individual benefit of the results
Team members have an intrinsic motivation and sense of mission and purpose for their actions. Actions are based on values.	Mission was perceived to be an abstract concept, although lack of it was continuously discussed. The team members seemed to be afraid of committing themselves.
Measuring performance: team-based measures are used and team members share efforts to achieve them.	Shared measures were avoided and individual measures were emphasized.
Conflicts are confronted, negotiated on, and solved. Conflicts are seen as learning possibilities to build a stronger team. Fruitful conflict resolution is emphasized	Conflicts were usually avoided and confronted only when avoidance was no more an option.

The teams in this study were formed on the basis of the student's selection on how he or she decided to study for the IT Bachelor degree, so the starting point was far from the starting point presented in the literature (see Table 10). Neither the team coaches nor the team entrepreneurs had much change to affect who decided to choose the ICT-ESP. Naturally some background discussions took place between the students and between the team coaches and students about what study path would be selected. Former friendships between the students affected the selection of the ICT-ESP with every studied team.

The starting point for the team coaching process was the results of the selection process. When the team coach knew who decided to choose the ICT-ESP, it was time to find out what expertise,

personalities and natural team roles were available. The leading idea for the author's coaching process was "The best team is the team available".

In the ICT-ESP, the balance between individual and team objectives was a continuous source of conflict. The team entrepreneurs began gradually to understand the meaning of the leading ideas (mission, vision, and values) and common goals and what would be the consequences of not focusing on them. At the same time with the progress towards the common goals set by the team entrepreneurs themselves made visible, it was found out that individual goals, such as extra conventional courses or working outside the team enterprise easily overruled the common goals. Some of the team entrepreneurs felt that it was not anyone else's business how an individual student scheduled his or her timetables. The situations where the team coach raised a discussion on the topic by making visible how much time everyone has between Monday and Friday and how much of it was spent to pursue common goals, caused anxiety among the team entrepreneurs. These discussions were tightly connected to the fundamental topics of being a team entrepreneurs, such as attitude, intrinsic motivation and commitment.

The dynamics concerning the leading thoughts: mission and purpose, vision, and values ("Why do we do this?", "What we are going to achieve?", "With what kind of boundary conditions?") in the ICT-ESP was found to be complex. The meaning of the concepts mission, vision and values were felt abstract at the beginning of the ICT-ESP. They became slightly clearer and more concrete during the coaching process when the team entrepreneurs got more experience on working together with more or less well defined leading thoughts, and they were continuously discussed again in the tryouts. One of the teams decided to form "satisfactory enough" leading thoughts and at the same time they admitted the paradox that "for a group of random individuals it might be too challenging to find a single mission and vision", as they expressed the situation themselves. The results of this decision have not been seen yet.

Measuring individual and team performance and making progress (see Table 10) compared to visible objectives was a new situation for most of the team entrepreneurs. Although several different practices to measure performance were discussed and experimented with, the overall attitude towards any measures was found to be slightly negative. In practice the team entrepreneurs expressed that they did not like the performance data to be public within the team. Furthermore, even when the individual goals were emphasized in the part of where team entrepreneurs' actions were compared to the common goals, they made the common performance measures visible rather than the individual measures. There were differences in the teams how this situation was resolved.

In the author's teams both individual and common performance data were made visible for the team as regular basis.

The teams described in the literature (see Table 10) mostly see conflicts as possibilities for team development and conflict resolution as a means to build a stronger team. Learning to face the conflicts which are an inevitable part of teamwork, and resolving them in a productive way was one of the big challenges in the ICT-ESP. There were both success and failures in learning to face challenging situations with the team. It was observed that some teams which were avoiding conflicts at the beginning learned to avoid them and found themselves stuck. They had become good at avoiding conflicts but not at facing or resolving them. The role of the team coach was crucial in intervening into situations where disagreements were hidden or conflicts were avoided. There were situations where the disagreements or conflicts were based on false assumptions, and the only needed action from the team coach was to make all the available information about the issue visible and to have dialogue based on the known facts. Some of the teams studied conflict resolution protocols based on their experiences. However, they have not yet been utilized in real situations.

### 5.3.2 Versatile role of a team coach

Coaching is the art of facilitating the performance, learning and development of someone else (Downey, 2003; Parppel 2008). Coaches are external stimulators to the potential that other people hold within them. They use a combination of patience, insight, perseverance and caring (sometimes called charisma) to help the coachee(s) find their internal and external resources to improve performance. According to Clutterbuck (2007) a team coach helps the team to improve their performance, and the processes by which performance is achieved, through reflection and dialogue. Coaching is based on the idea that a client is resourceful (Rogers 2008). Innovativeness is willingness and ability to introduce beneficial novelties. The team coach inspires the abilities and encourages team members to use them (Tuominen 2013).

The general objectives for coaching are: a) developing personal or group insight, b) performance towards specific goals, c) support and encouragement, d) experimentation, and e) effective use of questioning skills (Clutterbuck, 2007). The methods used in team coaching vary depending on the situation in which the coachees are. At a general level, the methods can be divided to directive (instructing, giving feedback) and non-directive (listening, paraphrasing, summarizing, and asking

open-ended questions) ones. The primary focus is on helping the coachees to help themselves to think, act, reflect, and by these means – to learn and develop.

When the team coach treats the learners as adults, shows trust and respect, expects responsible behavior and is at the same time committed to performance, the coachees will usually feel responsible and show mutual trust in return. The team coach has to truly follow theory Y rather than theory X (McGregor 1960; Greenberg and Baron 2008), meaning that people need to achieve and be responsible.

In the beginning of the group process (forming phase) the role of the team coach is crucial. The team members will follow every opinion and action; even the facial expressions of the team coach takes. What is said by the coach is important but even more important is what actions are taken. The basis for rules of conduct is formed in the very first team learning sessions. During the first few months, the team development practices should be emphasized.

The team members will construct their group role and identity based on the example they have taken from the team coach. The role of the coach as an example and as a role model in team learning sessions seems to be much stronger compared to conventional learning situations, such as lectures. It is the leader's responsibility to provide direction for the group and facilitate its internal processes. Depending on their task and maturity, groups require different types of leadership. The use of teams often changes the nature of leadership, because team leaders do not have the same power and authority as traditional managers (Levi 2007). On the other hand, when considering the team coach as a leader, the team members look up to the team coach even when the team coach is not an official leader of the team.

The role of the team coach is not always nice and easy. In the present study, the team entrepreneurs avoided now and then confronting challenging issues like violation of rules of conduct (which they had together decided to follow) and behaved against the objectives they had set to themselves. The confrontation and getting used to feelings of being responsible of oneself, team members, and also to their customers, requires a lot of practice. It is very human to avoid tasks that are not easy and require a lot of effort, but to be able to learn and develop one's skills they have to be done. Reflection is an essential part of the learning process for team entrepreneurs. The objectives of reflection are: to learn from perceived good practices and mistakes made during action, and to codify, externalize or canonize practices to make them part of organizational knowledge.

According to the results team entrepreneurs did not easily recognize reflection as a part of the learning process and in the early phases of team development they mostly found it annoying and / or waste of time, even when it was embedded in the dialogue during the team learning sessions. After running into the same kind of challenges a few times in a row, the essence of reflection on what had been learnt was reconsidered, and most team entrepreneurs took the initiative to reflect the on learnt without the coach' support. Sometimes the team entrepreneurs avoided reflection due to unsuccessful experiences of actions taken, or lack of planned actions. In these cases the team coach's role was to force confrontation with the avoided issues (Rogers 2008). In these situations, some of the team coaches decided to enforce some structures (e.g. presentation of project plan and budget) they saw important in increasing the number of planned operations.

Another important role for the team coach is to prevent groupthink (Irving 1982). As more or less an outsider, the team coach will probably notice when the team entrepreneurs are in danger of falling into the pitfalls of groupthink. In certain situations the team coach can bring some information or criticism to the dialogue by asking the team entrepreneurs to explore more options or to consider multiple viewpoints on the issue at hand (Venkula 2007; Marquardt 2009; Rogers 2008). In addition, the team coach needs to have courage to challenge the team entrepreneurs (Rogers 2004, 2008) when he or she notices that the dialogue will turn to a situation where only one, two or some of the most experienced or most popular team entrepreneurs are discussing or expressing their opinions. This can be done by asking open-ended questions such as: Are you sure this is always true? What is the evidence? Are there any other options? What other explanations might there be? What do the others think about this? These slightly provocative open-ended questions are meant to open up or relight a dialogue which may have turned to be a discussion or controversy of two participants.

Continuous discussion of the framework and guidelines for coaching and freedom to operate within the framework is essential for the team coaches. It is useful to share one's views on the team coaching with peers, more experienced coaches, and assistant coaches (members of the board in cooperatives) in the own organization and also other organizations. Acting as a team coach is a challenging task, and usually these unofficial mentor-like relationships are welcomed by both parties.

Clutterbuck (2007) divides coaching and mentoring competence to the following areas or disciplines: a) psychology (psychological coaching), b) business management (business coaching) c) profession / trade (business skills coaching), d) social work (life skills coaching), e) ministry

(spiritual coaching), and e) health professionals (health coaching). In the core of the coaching skills there is however, a lot in common with all the different applications of coaching. Essential competencies for the coach are lateral thinking, focus on the solution, effective communication, unbiased behavior, self-awareness, and professionalism.

Within the context of this study, the discipline of the team coach is not purely any of the alternatives presented above. A team coach coaching team entrepreneurs is mostly a learning coach. The learning coach is a combination of a business (skills) coach and life skills coach. The primary role for the learning coach is to help the team entrepreneurs to learn and develop. However, this goal cannot be achieved without committing oneself to discussing a subject that falls into the life coaching domain. It requires openness to rationality, feelings and emotions. We make decisions mostly based on our feelings and then justify them with intellect (Kets de Vries 2007, 2011). In team coaching one cannot deal with one without dealing also with the other.

Nonaka with his associates has introduced the term *Ba*, which in Japanese means a place, and is the foundation for knowledge-creation activity. *Ba* is a shared context in motion, in which knowledge is shared, created and utilized. A firm is seen as an organic configuration of multilayered *Ba* (Nonaka and Toyama 2005). Nonaka et al. (2001) call a person who is responsible for offering circumstances for knowledge creation a moderator of *Ba*. For an educator this would require a moderate change in the mindset. Rather than transferring information from teacher to students, the teachers' role would be staying more in the background creating the learning environment.

The study of Edmondson et al. (2001, p. 126) study supports the previous thoughts by arguing that “an overriding lesson was that the most successful teams had leaders who actively managed the teams' learning efforts”.

Jenkins and Jenkins (2006) define a facilitator – or facilitative leader – as an agent who enables groups from within and without the organization to produce their best wisdom and to implement able directions. The facilitator is familiar with methods of learning, and by being present in the learning situation is able to sense what methods will be needed to bring the learning process further. As a leader of learning, the facilitator needs to build an environment that encourages open dialogue in which people can risk sharing their ideas and thoughts.

One of the new roles of an educator is that of a maintainer of the learning environment (Jacques and Salmon 2007). The role includes functioning as a promoter of learning, being intellectually critical, stimulating and challenging, but within a context that emphasizes support and mutual respect.

The coach's task is to encourage, inspire (leadership-side) and demand and enforce (management-side) the team entrepreneurs to move from having a dialogue on what should be done to the action phase to get it done, and afterwards reflect on what has been learnt by doing it. Without learning by doing, both individually and through shared practice, new experiences and therefore new knowledge will not develop. Knowledge is always connected with practice, and without practice it will be only information. There are no shortcuts in the learning of new skills.

From the learner's point of view, team entrepreneurship contains three types of parallel challenges. Firstly, learning of new skills always takes time and a lot of practice. Secondly, team entrepreneurs need to learn business skills such as marketing and sales, making agreements, pricing of products and services, and productization. The third challenge is the versatile world of dynamics related to group processes. With the support of their team coach, team entrepreneurs also try to build business relationships with the team entrepreneurs of other cooperatives.

The obvious role for the team coach is to support the group development process of the team. In the context of the present study, the team entrepreneurs were young and they did not have many tools for coping with conflicts. That is why the conflict resolution during a storming phase of the group development process needed a lot of facilitation, caring and support from the team coach. Another important role for the team coach is to facilitate the learning of new skills. Most of the team entrepreneurs were young and had therefore less experience on learning how to learn skills. The team coach can help the individual team entrepreneurs to reflect on their personal learning history (Lencioni 2012) and analyze success stories and pitfalls in the tryouts. The sharing of success stories and active experimentation of new methods for learning will benefit the team. A team role test (Belbin 2003), learning style questionnaires (Honey and Mumford 2000; Prashnig 2000), and a good number of innovation tools (De Bono 1970) were introduced to the team entrepreneurs. These experiments may have helped the team entrepreneurs to understand each other and also the team coach to help team development by designing the future team coaching process. However, the results of these types of tests only suggest what kind of team roles or what kind of learning styles individuals would prefer. Whether an individual has an appropriate attitude and required motivational basis to learn as a team entrepreneur will not be revealed.

#### 5.4 Summary of the results

How does the ICT-ESP fit into IT Bachelor education then? As its current realization it does not fit well enough. The main inhibitors found during the study are listed here:

1. The communication of what the ICT-ESP is all about did not succeed. Some of the team entrepreneurs did not know well enough of what it would require to study as a team entrepreneur. Furthermore, the communication and cooperation between the personnel of the IT degree programme was not on a satisfactory level either. We failed to build a common purpose within the IT degree programme and to gain support for the ICT-ESP from all the colleagues. These challenges were mostly kept apart from the team coaching process but they inevitably affected the cooperation possibilities with colleagues.
2. A great deal of time and energy from the point of the team entrepreneurs was engaged in general subjects, such as mathematics and physics. The time and energy would have been needed for the team development, professional development, and seeking for customer relationships in the beginning of the three-year time frame as team entrepreneurs.
3. Clear roles and responsibilities between the team coach and team entrepreneurs from the very beginning of the learning process should have been emphasized better. The building of a culture of discipline should have started from the very beginning of the coaching process. There was room for improvement in setting the ground rules and practices for communication, and in the enforcement of the rules within all the cooperatives studied.
4. The amount of skills needed to learn to act as a team entrepreneur was huge. There is not enough evidence yet, but the authors' current best guess is that learning ICT parallel with all the skills needed to run a company together with several others requires a team of well-motivated individuals. Otherwise, the learning challenge compared to the given three-year timeframe may turn out to be too huge. The team entrepreneur's role with a lot of freedom and lot of responsibilities in one's own learning process was found to be challenging for many.

When considering the original research question “*How does a learning environment based on ICT entrepreneurship supported with team learning methods fit into IT Bachelor education?*” and its subquestions (see page 24 for more), a solid view was gained to be able to answer the question and justify the results gained. The roles and responsibilities of both the team entrepreneur and the team coach were presented. The challenges met during the development of the ICT-ESP were also listed. Furthermore, based on previous theories, models, and body of knowledge on team coaching and team learning combined to the results gained during the current study, a new coaching process for ICT-ESP was suggested (see Table 10 on page 73 for more) and discussed.



## 6. Discussion

According to several previous studies (European Commission 2006; Pihkala 2008) entrepreneurship education does not increase students' intentions to choose a career as entrepreneur in the European context. Pihkala (2008) concludes that entrepreneurship education may even decrease entrepreneurial intentions. This results has also been supported by Suominen (2013), who argues that current practices in entrepreneurship education may even decrease students' intentions to choose the career of an entrepreneur. Suominen claims, that positivist research has usually seen the behavior of human beings' as passive and / or objective rather than that of active agents creatively constructing new meanings. He continues by suggesting that ontological underpinning beneath entrepreneurship education should be re-examined to be able to gain better results from it.

Pihkala (2008) suggests that the role of real entrepreneurship interventions in fostering entrepreneurship intentions should be further studied, and the role of the means to affect students' self-efficacy and self-esteem should be emphasized. However, all these studies discuss intentions, and there are no real follow-ups on how the intentions have turned out into real actions.

Virkkunen et al. (2010) argue that professional development should not focus on educating students into how current professions are executed. They suggest that professional education should rather be focused on developing professions in cooperation with educating institutes and companies. Underneath these suggestions lies the activity theory (Vygotsky 1978; Engeström 2005). The ultimate goal is to help school and work life to collaborate in a better way. In times of rapid changes, educational arrangements including theory, practice and reflection repeat themselves in a continuing manner. All the described elements appeared in the deployment of the ICT-ESP, which followed the models presented by Kolb (Kolb 1984) and Nonaka and Takeuchi (1995).

Team entrepreneurship deployed as described in the current study may foster entrepreneurship intentions. The team coaching process applied in the ICT-ESP emphasizes the student's self-efficacy and self-esteem by versatile means, such as development of dialogue, collaboration and feedback and reflection skills. Naturally it is far too early to draw any conclusions on how these perceived entrepreneurship intentions will be deployed later. This could serve as a topic for further research. However, it has been found that the entrepreneurial intentions in a young stage of life have a positive correlation to entrepreneurial activity later in life (Krueger et al. 2000; Aldrich 2006).

One of the objectives of Universities of Applied Sciences in Finland is to educate youths and adults in the professions needed in companies in the local district. By team entrepreneurship, students are able to find out customer needs, develop the competencies needed in practice, and build their personal networks, mostly locally, at the same time. As Brown et al. (1989, p. 33) and many others since then have argued *“Activity, concept and culture are interdependent. No one can be totally understood without the other two. Learning must involve all three. Teaching methods often try to impart abstracted concepts as fixed, well-defined, independent entities that can be explored in prototypical examples and textbook examples. But such exemplification cannot provide the important insights into either culture or the authentic activities of members of that culture that learners need.”*

By combining the three elements of activity, concept and culture via team entrepreneurship and supporting the development of learners with the team coaching process – to be specific, learning by doing as a member of a team and reflecting on the experiences – educators at the Universities of Applied Sciences will be better equipped to meet the challenges for education in the 21<sup>st</sup> century. The current ICT-ESP deployment has offered the team entrepreneurs a possibility to meet the reality of a starting company quite well as it is. To offer the learners an opportunity to meet the reality as it is, is one of the main objectives of any education system. In that sense the ICT-ESP follows the principles of education well.

Unlearning from the earlier paradigm (conventional courses) and transformation into the new paradigm (the ICT-ESP) was hardest for those students and teachers who were used to teacher-led education where the educator is usually more active than the learner. The same beliefs about education and appropriate means on how to deploy it are quite common among authorities as well (Säljö 2001; Krogfors et al. 2010). The deployment of a new learning culture will take time (Senge et al. 1999; Schein 2004; Gary 2007), and with probable successes there will also be anxiety and frustration in the horizon.

The one and only possible basis for designing learning environments for higher education is that the students who have voluntarily applied for the education are motivated to learn. If the students are not motivated to learn, the solution cannot be found in any learning environment arrangements. Without the existence of intrinsic motivation, any arrangements carried out in the learning environment level will not help. There should be interviews or some other similar selection process of students who have intentions to study as a team entrepreneur. These intentions should be carefully screened to choose those students who have realistic expectations on studying as an ICT

entrepreneur. Those whose conception of entrepreneurship is “too romantic” (Sieger et al. 2014) and who seem to be looking for more freedom compared to responsibilities should choose to study by some other way. This suggestion is valid for any degree programme deploying team entrepreneurship. This pre-work would offer future cooperatives a better context for team building, creation of new business opportunities, and team performance.

## 6.1 Theoretical implications of the study

### **Team development**

According to several classical studies on teams, there are sequential phases in team development (Tuckman 1965; Drexler and Sibbet 1999; Hackman and Wageman 2005) which describe the overall development of a team. These general level descriptions are sound also in the context of learning teams. Above all, there seem to be certain team processes which repeat themselves in a cyclic manner within learning teams in the educational context. The results support the argument represented by Clutterbuck (2007), who argues that team coaching is a cyclic process where goal setting, organizing, and reviewing are repeated.

In the present ICT-ESP study, these processes repeated in a cyclic manner included clarification of leading thoughts, communication practices within the team, conflict resolution, balance between freedom and the individual's responsibility. These processes were tightly connected, and regular maintenance of these vital processes offered the team a possibility to develop. Building trust - giving others possibilities to behave in a trustworthy manner and behaving in a trustworthy manner towards others - via practicing dialogue and within the customer projects were the crucial practices by which the team development was fostered or hindered.

### **Knowledge management and knowledge creation**

The results of the study proved the relevance and usefulness of Nonaka's knowledge theory (Nonaka 1994; Nonaka and Takeuchi 1995) and the experiential learning cycle (Kolb 1984). When teams are used in the educational context, all essential elements of learning have to be in their place. The team entrepreneurs have to learn theory (externalization) from textbooks, articles etc., they have to participate in customer projects (internalization), and reflect via dialogue what they have been learning from theory and practice and how to combine the two to create new knowledge (socialization and combination). Without participating in this creation and interplay of explicit and tacit knowledge, both individual and team learning will soon diminish and eventually stop. In

parallel with the current study, the author coached two groups of adults in a totally different context. Regardless of the different context, the elements of knowledge theory seemed to work well with individuals from of different age and work history. The challenges concerning the unlearning of old paradigms were also found to be very similar.

Team coaching and team leadership have been emphasized in the current team coaching literature. In the context of the University of Applied Sciences, when coaching young team entrepreneurs, the role of management of learning cannot be underestimated. The team coach has to set clear guidelines for learning and measure them actively and publicly. Although it would be best that the team entrepreneurs would learn to set and enforce the objectives and their measures themselves, the results of the study showed that this will not happen in practice, at least in the given timeframe. Even though the ICT-ESP provided a lot of freedom for the team entrepreneurs, the measurement of the performance results had to be insisted on and nonperformers had to be made to face the situation where they were. In the context of the University of Applied Sciences, some performance measures are always given from the outside and every educator's task is to foster the achievement of these measures. These management duties of the team coach makes the task of the team coach controversial. As the leader, one should encourage and inspire, and as the manager of the learning also demand and enforce. It requires deep mutual trust between the team entrepreneurs and the team coach to be able to succeed with both duties.

## 6.2 Implications for practice

Playing with two controversial rules (those of conventional courses and those of team entrepreneurship) was perceived to be mentally tough. At the same time it was found out that some of the team entrepreneurs tended to search for individual benefits from the ICT-ESP. In other words the freedom was used but the individual's responsibility as a member of a team was not deployed as well as it should have been. These violations of the "spirit of team entrepreneurship" were observed in every team and they caused a lot of energy to be spent in vain. For team entrepreneurship and in other types of group development studies it would be very beneficial to recognize early enough those who are team players and those who are not. The solo-players who might become destructive for the team should be recognized soon enough so that the team coach could help the team and the individual to find an appropriate solution for the situation. An even worse situation will come up when there are negative or questionable attitudes within the team. If the team coach does not make an immediate intervention to the situation (and ask individuals to correct their attitude and or find their motivation) the team coach gives for the team members the message that it is normal to behave

like that. This will then affect also to those team entrepreneurs who had a good attitude and whose motivation was originally appropriate. The team will then probably end up in a complex situation of multiple-level crises. The situation described here actually took place with one of the teams during the study, and based on the observations, the interventions which would have been needed took place too late.

In an ideal world those who want to study as team entrepreneurs would be carefully selected by learning style tests and interviews to find out something about the motivational basis of the students. This would provide the team with the best possible baseline to start and develop. Before this could be employed in practice there should naturally be enough students to select from. Considering the possible development of the ICT-ESP in a longer run, it is probable that in later years the students choosing the ICT-ESP would have been applicable without much selection due to the maturation of the team entrepreneurship culture.

### **Suggested adjustments for the current ICT-ESP**

First, students who are about to choose the ICT-ESP for their way of studying for the IT Bachelor Degree should be provided with the facts of the study path where they are heading. Although this was the first employment of ICT-ESP ever in the context on Universities of Applied Sciences, the personnel knew that there would be a lot of differences compared to the other pedagogical arrangements tried before. The communication about these issues failed partly. If both the possibilities and challenges of the ICT-ESP had been clearly explained, there would probably have been smaller teams in the beginning, and the team members would have been equipped with more realistic expectations of the journey ahead of them.

Second, general topics such as mathematics, physics and languages should be integrated to the ICT-ESP path by integrating the relevant content of the courses into the team coaching process (see Figure 10). When a student decides to select the ICT-ESP, how can we justify the current amount of courses in mathematics and physics? Furthermore, how could educators even try to design a relevant content for the courses when the upcoming projects and challenges with them are not yet known? The teaching of mathematics, physics, and language for the ICT-ESP should be arranged as consulting. The teachers of mathematics, physics and language could act as consultants for the team entrepreneurs in their practical problems when they appear. The parties (the teachers and the team entrepreneurs) could meet for example twice a week, and in other times stay in contact via e-mail. Every party would benefit of this kind of an arrangement. The team entrepreneurs' increased

motivation could turn up as better learning outcomes, which would help organizations to meet their performance objectives better, which is the basis for the funding of educational institutes.

At the same time the mathematics, physics, and language teachers would benefit from their enriched work description and they would have opportunities to learn new things continuously from the practical projects of the team entrepreneurs. The learning situations would probably be new for everyone, but as more experienced learners the teachers would inevitably be able to help the team entrepreneurs to make progress. Extra resources would not be needed for these arrangements, because at the same time less conventional courses on these subjects would be required.

Furthermore, the arrangements described here would make it possible to utilize one or two student assistants, in an ideal situation one for the general topics (mathematics, physics, and languages) and another for the ICT-related topics.

Third, should it be time to get rid of the beliefs that learning always happens in a certain order, could be split into small pieces, and could be measured only in a few pre-defined ways? When considering our everyday life we are learning a lot of things all the time – in parallel and in a random order. Should practical needs guide the learning of theory? When we are not able to solve certain practical challenges, would it not be an appropriate time to study how others have solved the same challenge (theory)? In case learning goes on smoothly, the customers are satisfied and professional development takes place as planned without studying more theory, what is the role of the theory after all? There is no reason to study theory “just in case” or “for later use”, because it is well known that when we study by memorizing facts, we will forget a remarkable part of the content which we cannot apply to practice and by that way connect them to our previous experiences.

On the basis of the authors’ experiences on the coaching and the literature studied during the study, an integrated model for team coaching for the ICT-ESP is suggested. The model is applicable to other degree programmes where team entrepreneurship is employed as well. The model is presented in figure 10 below.

**The suggested team coaching process for the ICT-ESP**

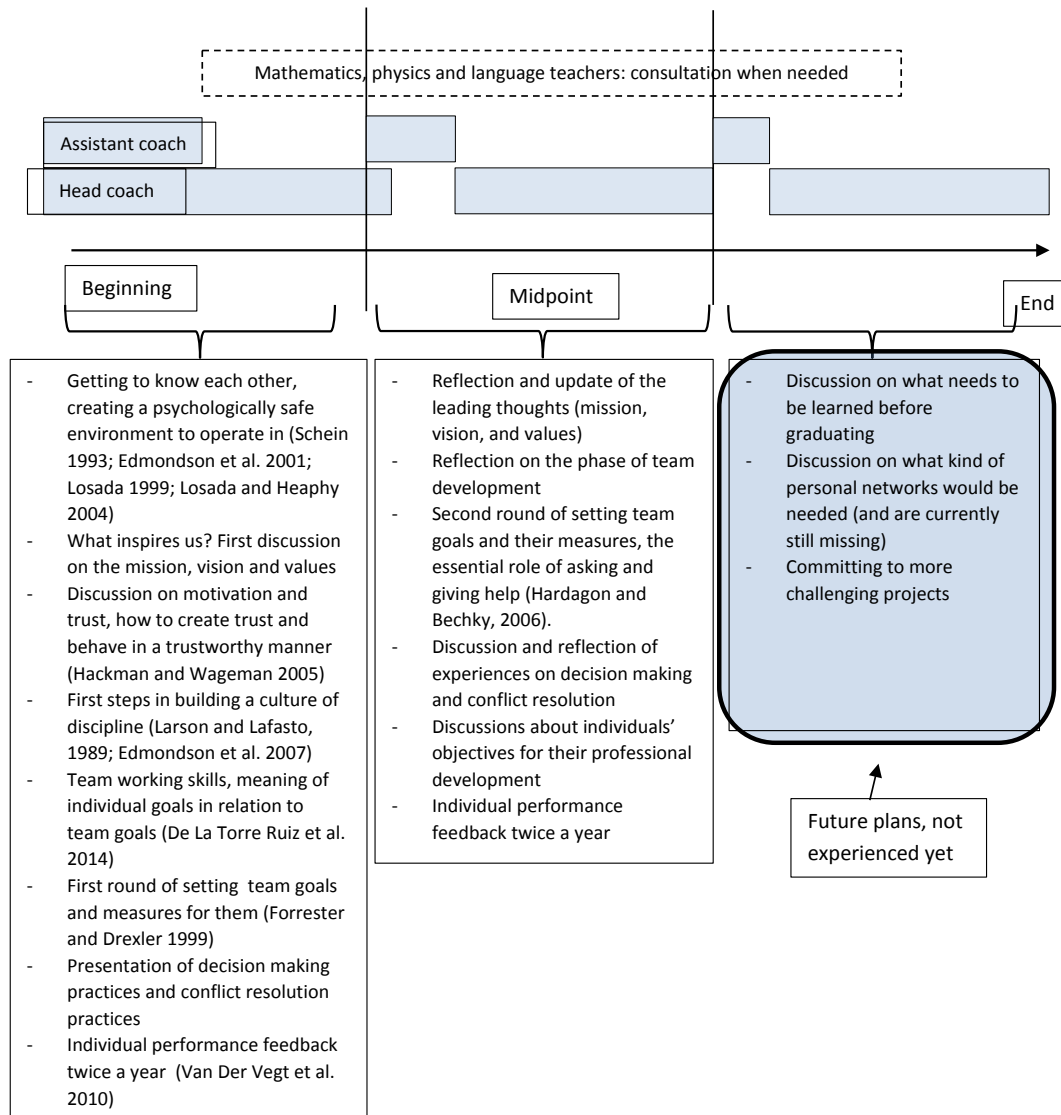


Figure 10. The suggested team coaching process for the ICT-ESP.

There are also tasks for the policy makers. National governments should focus on providing people interested in becoming entrepreneurs with an “easier access to different capital types but also to ensure that external resources can be combined effectively with the skills and experiences that aspiring entrepreneurs already possess. Otherwise, their knowledge, even if inherently useful for entrepreneurship, may be channeled toward alternative activities that demand less effort and confront less uncertainty” (Amorós and Bosma 2014, p. 73). Individuals interested in developing their own businesses should be really supported by the authorities. There is still a lot of work needed with productization of entrepreneurship-related services to make them support the needs of a micro company. The team entrepreneurs are potential future entrepreneurs, and currently the topic of how the authorities could support these young people to continue easily as entrepreneurs after their graduation is under discussion.

### 6.3 Contribution of the study

The research strategy and longitudinal study offered possibilities to gain a lot of insights into how the ICT entrepreneurship and same kind of deployment with marketing students was perceived by those who acted as the team entrepreneurs. Spending from six to twelve hours per week with the team entrepreneurs offered the author a special opportunity to take a closer look at how the culture of the cooperative emerged and developed. After analyzing the data and reflecting on past experiences, a new plan with observations and interviews was made. The possibility to enter the field over and over again easily, was something that lot a of academics may even envy.

The authors’ role as an interviewee and as a participant observer - since January 2012 also as a team coach - provided an opportunity to collect a huge amount of qualitative data. Naturally some of it remained confidential between the team coach and the team members. However, a lot of insights gained during e.g. formal development discussions and informal “sauna evenings” were later made public to the team by the team entrepreneurs themselves. The dual role of the author as an observer and as a change agent working in the background, and in the later phase of the study as a team coach and an active change agent probably provided both a richer and more realistic picture of what the ICT-ESP was all about.

Dialogue as the essential method for communication within the ICT-ESP taught every participant a lot. The basic rules of dialogue - speaking in one’s own voice, respect, listening (not just pretending to), and suspended judgment-making - turned out to be a powerful tool for personal and team



development. There were a lot of opportunities for all the participants to challenge their own assumptions and beliefs over and over again. The amount of learning was huge for everyone, including the team coaches.

The results of the study provided a solid description of the employment of the ICT-ESP which had not been employed into IT Bachelor education elsewhere in Universities of Applied Sciences before. A set of relevant literature concerning pedagogics of entrepreneurship education, team coaching, knowledge creation and innovation was presented for educators to study. These will help understand the very essence of the possibilities and challenges of team coaching better as a rigorous pedagogical approach, as well as the team learning methods used to support the team entrepreneurs studying in the ICT-ESP. Trying new approaches in education can be far from easy and it will require a group of encouraged agents for change to get it done. It is ironic that it was decided to terminate the IT Degree Programme before any results were gained from the ICT-ESP and before the new culture of learning IT as a team entrepreneur was able to spread.

#### 6.4 Limitations of the study

There are several limitations to consider about the current study. First, only three teams were used as main research targets. Furthermore, only two of them were examined closely, other teams served mainly as targets for theoretical sampling via some observations, and individual and group interviews. A total of seven teams were involved in the ICT-ESP study and the author was able to take a closer look at only two of them. The observation period of the two teams could also have been longer, and the third team could have been observed more than it was possible to do in the ICT-ESP study. Due to practical limitations, such as doing the research while working, there was no chance to spend more time to observe more teams.

For the teams studying marketing, the context and challenges of professional development were quite different, and comparisons between these two could be made only partly - even though the challenges concerning team development and the issues related to it were found to be almost the same with both programmes. Based on the authors current best knowledge there still does not exist other implementations of ICT entrepreneurship in the context of Universities of Applied Sciences. Therefore there was no path to follow or targets for comparison and benchmarking.

The second limitation of the study is the number of disciplines this kind of study is related to. Themes such as pedagogy, entrepreneurship, entrepreneurship education, management and leadership, organizational learning and learning organization, coaching and team coaching, group dynamics, knowledge sharing, knowledge creation, and innovation are all connected to the employment of the ICT-ESP. The study was multidisciplinary, but on the other hand, so was the team coaches' task operating within the developed learning environment. Studying human beings is always a complex task including versatile viewpoints.

The decision made by the Finnish Ministry of Education and Culture to terminate the IT Bachelor Degree Programme at Saimaa University of Applied Sciences had drastic consequences to the ICT-ESP. The decision was announced in the beginning of October 2011. After the decision a new era started at the campus. As expected, some individuals started to focus on the future of their personal career. At the same time all the development activities were naturally abandoned. Later, due to changes in personnel, there were also changes in team coaching arrangements which caused a radical change to one of the cooperatives under investigation. Due to these drastic changes, also the team entrepreneurs started to show worry about their possibilities to complete their studies within the ICT-ESP as planned. This single event (termination) caused a change in the attitudes towards the ICT-ESP. It was noticed that some team entrepreneurs and also some members of the personnel seemed to think that that ICT-ESP had failed. In practice, the IT degree programme was shut down based on data from a time period when the ICT-ESP was not yet in existence. Anyway, after the shutdown decision attitudes and motivation to carry on had to be rebuilt. Some of the colleagues were able to do it and some were not. When the context radically changed, it was naturally harder to carry on with the study, and this has to be considered as a third limitation of the study.

## 6.5 Evaluation of the study

When evaluating a study as a whole it is time to look back and estimate what the objectives of the study were, where we are now and what kind of a journey has taken us here. It also includes an estimation of how the interpretations and conclusions appear to the readers. Miles and Huberman (1994) list several viewpoints on how the goodness of the conclusions of a study can be estimated. The goodness of conclusions mean that they are *reliable, valid, possibly or probably true, dependable, reasonable, confirmable, credible, and useful*. These factors are discussed below to evaluate the reliability and the validity of the ICT-ESP study.

### **Reliability and validity of the study**

Reliability concerns the extent to which the findings would emerge if the study was repeated in the same context (Yin 1994). Once we treat social reality as always changing, it makes no sense to worry about whether the research instruments measure accurately (Silverman 1993). The reliability means to what extent the researcher can trust the findings of the study.

Validity is a concept designating an ideal state – to be pursued, but not to be attained. Validity is like integrity, character, or quality, to be assessed relative to the purposes and their circumstances (Brinberg and McGrath 1985). McNiff and Whitehead (2010) separate personal and social validation. Personal validation or self-validation is about considering how the chosen methodologies and the knowledge gained via them represent the values the researcher has. In case the evidence gained is in balance with the evidence, then a personal validation is achieved. Social validation is when others test what you are saying in the light of the evidence you are offering.

Validity has been divided into: a) descriptive validity (amount and accuracy of data), b) interpretative validity (whether the events identified in the data are interpreted correctively in relation to the aims of the interviewees), c) and theoretical validity (whether the accounts functions as correct explanations of the phenomena) (Maxell 1992).

The current study utilized method triangulation (Denzin 2009) by using data archives, theme-bases interviews, and both direct and participative observation. Furthermore, also researcher triangulation was utilized during the study by analyzing part of the data from different viewpoints and publishing scientific articles based on the data together with colleagues, and by having a huge amount of official and unofficial team coach meetings.

### **Generalizability of the findings**

Generalizability refers to the extent to which the results can be extended to other organizations, persons, times or settings (Maxell 1992). Generalizability is divided into internal and external generalizability. Internal generalizability refers to generalizing the findings within the community, group or institution studied to persons, events and settings that were not directly observed or interviewed.

Lincoln and Gupta (1985) discussed the generalizability of action research. According to them, if there is to be transferability, the burden of proof lies less with the original investigator than with the

person seeking to make an application elsewhere. The original inquirer cannot know the sites to which transferability might be sought, but the applicators can and do. The best advice is to give to anyone seeking to make a transfer to accumulate empirical evidence about contextual similarity; the responsibility of the original investigator ends in providing sufficient descriptive data to make such similarity judgments possible. Flick (2009) also sees the burden of proof in qualitative methods, especially with the Grounded theory method, in a similar way. He suggests that the discussion of validity should concern the transparency of the whole research process rather than concentrate on assessing individual steps of the research process. Flick goes on by arguing that the application of qualitative methods should be judged for their soundness with regard to embedding them in the process of research and to the issue of the study and less for its own sake.

The concept generalizability in the context of qualitative study is somehow confusing. A qualitative study is usually embedded in a rich context where a group of individuals interact. The objective is in most cases to describe and interpret the participants' expressions on the topic. The situation is similar with the ICT-ESP study as well. The objective of the ICT-ESP study was not to generate generalizable results - instead it was to find out how the current deployment of the ICT-ESP would fit into IT Bachelor education from the viewpoints of the team entrepreneurs studying in it and from the team coaches involved in the team coaching process of it. However, the results may be analytically (not statistically) generalized, meaning that the findings gained from the ICT-ESP study may reflect the findings of other studies.

The over four-year period of the ICT-ESP study offered a huge amount of qualitative data of the research target and the phenomena around it. Having the research target near to the researcher's daily work made it possible to utilize theoretical sampling whenever needed to validate the findings and to gain more understanding about the studied phenomena. In addition to the amount of available data, the researcher worked closely with other team coaches - both the team coaches of IT cooperatives and later with the team coaches of the marketing cooperatives - and was able to discuss and sometimes also test and challenge the assumptions about the team coaching process (searching the negative cases) on a daily basis. The research context made it possible to cross-validate the findings by method and researcher triangulation. The rhythm of the academic work within the University of Applied Sciences with long summer holidays also offered the author the possibility to detach himself from the study for a while and then again access it with a fresh brain.

The research process started with theme-based interviews and direct observation, turning later into action research and participative observation, where the author acted as an active agent for change. The use of the constant comparative method, theoretical sampling, and official and unofficial discussions with the team coaches within the action research framework strengthened the reliability and validity of the ICT-ESP study. The continuous reflection about “what was going on with the ICT-ESP” that took place at several levels with both the team entrepreneurs and team coaches has proved to be a useful tool to guarantee the confirmability of the ICT-ESP study.

The overall research process and the results of the ICT-ESP study were described in a solid and transparent manner (Chapter 3), and in addition to the original papers, quotations from the interviews, illustrations and tables were represented to offer the reader a possibility to make his / her own judgments of the interpretations made. The results were represented as they were with no overstating and they were considered to be true. The author represented his own epistemological and ontological standpoints and possible limitations caused by bias (Chapter 3.2.6) to provide the reader the possibility to evaluate the dependability and credibility of the ICT-ESP study.

The author was able to answer the research question and its subquestions presented in the beginning of the study. The roles and responsibilities of both the student studying at the ICT-ESP and the team coach were clarified. In addition, the challenges faced were clearly described and the coaching processes used was represented and suggestions to develop were represented. The results gained were reasonable and a part of them were already validated in the coaching of the team entrepreneurs. Suggestions were made for those who were interested in considering the ICT-ESP as an approach for the IT Bachelor education and thus the results were also relevant and useful. From the viewpoint of the objectives set, the ICT-ESP study can be considered as a success.

## 6.5 Future research areas concerning the topic

There are some topics related to the current study which are worth further examination. First, a follow-up study where the entrepreneurial intentions held during studying in the ICT-ESP should be observed in e.g. two or three years after graduating. Secondly, if there were a University of Applied Science encouraged enough to deploy the ICT-ESP where subject as mathematics, physics, and languages would support the team coaching process, the opportunity should be carefully studied. Finally, an implementation where students from two or three different degree programmes would establish a cooperative together should be employed and carefully studied.

In real life we work with people with different backgrounds, skills and competencies. Why could we not do it also during our education? It would certainly be a pedagogical challenge for educators, but should in not be seen as an opportunity for learning and developing, as individuals with an entrepreneurial mindset tend to claim?

## 7. Conclusion

According to the results of the study, the ICT-ESP as its current employment does not fit well enough into IT Bachelor education. For team entrepreneurs there are at least two contradictory paradigms: 1) the conventional paradigm including enrollment to courses where special topics are taught, and 2) the ICT-ESP. The number of cognitive challenges is too big for the four-year (eight-semester) degree. Before the students start as team entrepreneurs within the ICT-ESP they have studied at least thirteen years in a more or less conventional way. The unlearning challenge is enormous and only part of the team entrepreneurs were able and willing to go through it. For several team entrepreneurs, transforming oneself from a quite passive student following mostly teacher-led courses to an active learner and to an initiative change agent was too big in the given time frame.

The theories of team coaching and team learning methods formed a solid basis for the ICT-ESP employment. In addition to the team coaching, also team leadership and management structures were needed. The learning objectives with the teams were emphasized but at the same time the performance metrics supporting the progression of one's studies (reading books, participating in tryouts and doing projects) had to be demanded and structures to achieve them had to be enforced. After all, the ultimate objective with the ICT-ESP was to educate IT Bachelors equipped with the skills and competencies needed in the industry. It needs to be born in mind that the education of an IT Bachelor still takes at least four years, which is a very long time compared to the fast changes taking place in the industry. It can be asked whether it is the conventional way of educating IT Bachelors or ICT-ESP -like pedagogical arrangements which produces graduates who are ready for ongoing change.

If an ICT-ESP -like model is employed elsewhere, the most important single issues would be to communicate soon enough that the ICT-ESP is a tough path where there is no room for free riders, solo-players, or those who have a too romantic view on what learning as team entrepreneur is all about. Based on the results and the researcher's current understanding, this was where the biggest mistakes were done with the current project. The lack of discipline in the beginning of the team development process and the lack of required management structures to guarantee the required performance to support those students who would prefer to study as team entrepreneurs made the team development process very challenging.

## **Final words**

Currently, there is one actively working IT cooperative, *Aedo Group*, where eight team entrepreneurs study for the IT Bachelor degree at Saimaa University of Applied Sciences. The two other IT cooperatives, *Icaros* and *Ideatech* are finishing their journey and some of the team entrepreneurs are about to finish their studies, some already finished them.

There are also two more cooperatives, *Loiste*, and *Setentia*, which are specializing into marketing within the Business Administration degree programme at Saimaa University of Applied Sciences. The author started as the team coach for one of these cooperatives, *Setentia*, from the beginning of August 2013. When the current study is finished, the action research will go on. In the future, there will be a possibility to combine the good practices of these two separately developed learning environments where the team entrepreneurs have been studying.

ICT entrepreneurship and team learning includes phenomena which could be described at any detailed level, and part of them would still sound more or less mysterious to a random reader. These are the parts of the phenomena concerning team learning, which one has to experience by participation. Team learning offers something to all of our senses - both as good experiences and as tough challenges. The information can be shared by writing reports. The feelings and emotions during the learning process have to be experienced, they cannot be found in the research reports. The team entrepreneurs of *Icaros*, *Fissio*, *Ideteach*, *Kiintopiste*, *Aedo Group*, and *Setentia* have deserved the author's high appreciation through the learning experiences we shared during the journey.



## 8. References

- Aldrich, H. (2006). *Organizations evolving* 2nd edition. Sage Publications, London, United Kingdom.
- Amabile, T. & Kramer, S. (2012). *Pienet suuret teot. Opi johtamaan kehitystä*. Balto print, Lithuania. (In Finnish)
- Amorós, J.E. & Bosma, N. (2014). *Global Entrepreneurship Monitor 2013 Global Report. Fifteen years of Assessing Entrepreneurship across the Globe*. (Available in PDF format in: <http://www.gemconsortium.org/docs/download/3106>)
- Argyris, C. (1991). *Teaching Smart People to Learn*. Harvard Business Review, Vol. 4. No 2.
- Argyris, C. & Schön D., A. (1978). *Organizational Learning: A Theory of Action Perspective*. Reading, Massachusetts: Addison-Wesley.
- Argyris, C. and Schön, D. (1996) *Organizational learning II: Theory, method and practice*. Reading, Mass: Addison Wesley.
- Bales, R. (1966). *The equilibrium model for small teams*, In A. Hare, E. Borgotta, & R. Bales (Eds.) *Small Groups: Studies in social interactions*, pp. 444 – 476. New York, Knopf.
- Bandura, A. (1977). *Social Learning Theory*. Prentice Hall. Printed in the United States of America.
- Bandura, A. (ed.) (1986). *Social Foundations of Thought and Action*. Prentice-Hall. Printed in the United States of America.
- Barron, B. (2006). *Interest and self-sustained learning as catalysts of development: A learning ecology perspective*. Human Development, Vol. 49, pp. 193 – 224.
- Belbin, R. M. (2001). *Managing Without Power. Gender Relationships in the story of Human Evolution*. Butterworth-Hiemann. Printed in Great Britain.
- Belbin, R. M. (2003). *Team Roles at Work*. Elsevier.
- Bennett, R. (2006). *Business lecturers' perceptions of the nature of entrepreneurship*. International Journal of Entrepreneurial Behavior and Research, Vol. 12, pp. 165 - 188.
- Berson, Y., Nemanich, L.A., Waldman, D.A., Glavin, B.M. & Keller, R.T. (2006). *Leadership and organizational learning: A multiple levels perspective*. The Leadership Quarterly, Vol. 17, pp. 577 – 594.
- Bion, W.R. (1959). *Experiences in Groups and Other Papers*. London: Tavistock
- Bird, B. (1988). *Implementing Entrepreneurial Ideas: The Case for Intention*. Academy of Management Review, Vol. 13, No. 3, 442-453.
- Bohm, D. (1996). *On dialogue*. Routledge. London and New York.

- Boud, D., Keogh, R. & Walker, D. (1985). *Reflection: Turning Experience into Learning*. Kogan Page, London, New York.
- Boud, D., Cressey, P. & Docherty, P. (2006) (eds.). *Productive reflection at work*. Routledge. Simultaneously published in the USA and Canada.
- Brinberg, D. & McGrath, J.E. (1985). *Validity and the Research Process*. Sage Publications. Printed in the United States of America.
- Brown, J., Collings, A. & Duguid, P. (1989). *Situated Cognition and the Culture of Learning*. *Educational Researcher*, Vol. 18, No. 1, pp. 32 – 42.
- Brown, J. & Duguid, P. (1991). *Organizational Learning and Communities of Practice; Toward a Unified view of Working, Learning and Innovation*. *Organization Science*, Vol. 2, No. 1, February 1991.
- Burstein, F. & Linger, H. (2003). *Supporting post-Fordist work practices. A knowledge management framework for supporting knowledge work*. *Information Technology & People*, Vol. 16, No. 3, pp. 289 – 305.
- Bygrave, W.D. & Hofer, C.W. (1991) “Theorizing about Entrepreneurship”, *Entrepreneurship Theory and Practice*, Vol. 16, pp. 13 - 22.
- Callison, D. & Lamb, A. (2006). *Authentic learning and assessment*. In D. Callison & L. Preddy: *The Blue Book*. Libraries Unlimited.
- Carrier, C. & Kyrö, P. (2005). *The dynamics of learning entrepreneurship in a cross-cultural university context*. University of Tampere School of Economics and Business Administration.
- Cartwright, D. & Zander, A. (1960). *Group Dynamics. Research and Theory*. Second edition. Tavistock publications.
- Cassell, C. & Symon, G. (2004). *Essential Guide to Qualitative Methods in Organizational Research*. Sage Publications.
- Chang, A. Bordia, P. & Duck, J. (2003). *Punctuated Equilibrium and Linear Progression: Toward a New Understanding of Group*. *Academy of Management Journal*, Vol. 46, No. 1, pp. 106 - 117. Available in PDF format in: [http://www.owl.net.rice.edu/~ajv2/courses/12c\\_psy438001/Chang%20et%20al.%20\(2003\).pdf](http://www.owl.net.rice.edu/~ajv2/courses/12c_psy438001/Chang%20et%20al.%20(2003).pdf) Accessed on 12<sup>th</sup> of June 2013.
- Chell, E. (2004). *Critical Incident Technique*, in Cassell, C. & Symon G. (Eds.) (2004). *Essential Guide to Qualitative methods in organizational research*. Sage Publications.
- Choi, Y. R., & Shepherd, D. A. (2004). *Entrepreneurs’ Decisions to Exploit Opportunities* *Journal of Management Studies*, Vol. 30, No. 3, pp. 377 - 395.
- Cialdini, R. B. (1984). *Influence. The new psychology of modern persuasion*. Quill, New York.
- Clutterbuck, D. (2007). *Coaching the Team at Work*. WS Bookwell, Finland.
- Collins, J. (2010). *Hyvästä paras*. 10. painos, Talentum Oy. (In Finnish)

European Commission. Lifelong Learning Programme Available in: [http://eacea.ec.europa.eu/llp/index\\_en.php](http://eacea.ec.europa.eu/llp/index_en.php)  
(11.6.2014)

European Commission (2006). Communication from the commission to the council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, Implementing the Community Lisbon Programme: Fostering entrepreneurial mindsets through education and learning. Available online at:  
[http://eurlex.europa.eu/LexUriServ/site/en/com/2006/com2006\\_0033en01.pdf](http://eurlex.europa.eu/LexUriServ/site/en/com/2006/com2006_0033en01.pdf)

Cooper, J., Kelly, K.A. & Weaver, K. (2001). Attitudes, norms and Social Groups in M.A. Hogg, S. Tindale (eds). Blackwell Handbook of Social Psychology: Group Processes. Blackwell Publishing. Printed and bound in Singapore.

Corbin, J. & Strauss A.(2008) Basics of Qualitative Research 3e: Techniques and Procedures for Developing Grounded Theory. Sage Publications.

Cunningham, I. (1999). The wisdom of strategic learning. MPG Books Ltd, Printed in Great Britain.

De Bono, E. (1970). Lateral Thinking. Penguin books Ltd.

De Geus, A. (1997). The Living Company. Harvard Business School Press.

De la Torre-Ruiz, J.M., Ferron-Vilchez, V. & Ortiz-de-Mandojana (2014). Team Decision Making and Individual Satisfaction With the Team. Small Group Research, Vol. 45, Issue 2, pp. 198– 216.

Denning, P.J. & Dunham, R. (2010). The Innovators Way. Essential practices for successful Innovation. The MIT Press, Cambridge, Massachusetts, London, England.

Denzin, N. K. (2009). The Research Act. A Theoretical Introduction to Sociological Methods. Library of Congress. Printed in United States of America.

Denzin, N. K. & Lincoln, Y.S. (eds.) (2005). The Discipline and Practice of Qualitative Research. Sage Publications. Printed in United States of America.

Dilts, J. C., & Fowler, S. M. (1999). Internships; preparing students for an entrepreneurial career. Journal of Business and Entrepreneurship, Vol. 11, No.1, pp. 51 - 63.

Douglas, K (2009). The Firefly Effect. Build teams that capture creativity and catapult results. Library of Congress. Printed in the United States of America.

Downey, M. (2003). Effective Coaching. Lessons from the Coach's Coach. Cengage Learning.

Dyer, J., Gregersen, H. & Christensen, C.L. (2011) The Innovator's DNA. Mastering the five skills of disruptive innovators. Harvard Business Review Press.

Forrester, R. & Drexler, A. (1999). A model for team-based organization performance. The academy of Management Executives, Vol. 13 No. 3. Available in: [www.jstor.org/pss/4165563](http://www.jstor.org/pss/4165563)

- Edmondson, A., Bohmer, R. & Pisano G. (2001). Speeding Up Team Learning. *Harvard Business Review*, October 2001, pp. 125 – 132.
- Edmondson, A.C, Dillon, J.R. & Roloff, K. (2007). Three perspectives on team learning: Outcome improvement, task mastery, and group process. In J.P. Walsh, A.P. Brief (Eds.). *The academy of Management Annuals*. Psychology Press, Lawrence Erlbaum, Mahwah, NJ, pp. 269 - 314.
- Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy Management Review*, Vol. 14. No. 4, pp. 532 – 550.
- Eisenhardt, K. M. & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, Vol. 50, No. 1, pp. 25 – 32.
- Elmholdt, C. & Brinkmann S. (2006). Discursive practices at work. Constituting the reflective learner. in Boud, D., Cressey, P. & Docherty, P. (2006) (eds.). *Productive reflection at work*. Routledge. Simultaneously published in the USA and Canada.
- Engeström, Y. (1991). Non scolae sed vitae discimus: Toward overcoming the encapsulation of school learning. *Learning and Instruction: An International Journal*, Vol. 1. Pp. 243 – 259.
- Engeström, Y. (2005). *Developmental work research: Expanding activity theory in practice*. Berlin: Lehmanns Media.
- European Commission (2005). *Triggering a New Generation of Entrepreneurs: Students Breathe New Life into EU-entrepreneurship*. Commission of the European Communities, Brussels, Belgium, 7.6.2014, Available from: <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/05/315&format=HTML&aged=1&language=EN&guiLanguage=fr>
- European Commission (2013). *Entrepreneur Education: A Guide for Educators*. Bruxelles, June 2013.
- Flick, U. (2009). *An Introduction to Qualitative Research*, Edition 4. Sage Publications.
- Forrester, R. & Drexler, A.B. (1999). A model for team-based organization performance. *Academy of Management Executive*, Vol. 13, No. 3.
- Forsyth, D.R. (2010). *Group Dynamics*, 5<sup>th</sup> edition. Belmont, CA. Wadsworth, Centage Learning.
- Galloway, P.D. (2008). *The 21<sup>st</sup> –century Engineer. A Proposal for Engineering Education Reform*. Asce Press. Manufactured in the United States of America.fr
- Gattie, D.K., Kellam, N.N., Schramski, J.R. & Walther, J. (2011). Engineering education as a complex system. *European Journal of Engineering Education*. Vol 36, No. 6, December 2011, pp. 521 – 535.
- Gersick, C. (1988). Time and transition in work teams: Toward a new model of group development, *Academy of Management Journal*, Vol. 31, pp. 9 - 41.
- Gibb, A. (2005). The future of entrepreneurship education – Determining the basis for coherent policy and practice?, in Kyrö, P. and Carrier, C., *The dynamics of learning entrepreneurship in a cross-cultural university context*,

Entrepreneurship Education Series 2/2005, Hämeenlinna: University of Tampere, Research Centre for Vocational and Professional Education 44-67.

Gibb, A. (2007). Creating the entrepreneurial university worldwide: Do we need a wholly different model of entrepreneurship. In A. Fayolle (Ed.), *Handbook of Research in Entrepreneurship Education: A general perspective*. Cheltenham, UK: Edward Elgar Publishing.

Glaser, B.G. (1965). The constant comparative method of qualitative of qualitative analysis. *Social Problems*, Vol. 12, No. 4, pp. 436 – 445.

Glaser, B. G. (1969). “The Constant Comparative Method of Qualitative Analysis”, in G.J. McCall and J.L. Simmons (eds.), *Issues in Participant Observation*. Reading, MA: Addison-Wesley.

Glaser, B. G. (1998). *Doing Grounded Theory: Issues and Discussions*. Sociology Press. Printed in United States of America.

Glaser, B.G. (1978). Theoretical sensitivity. *Advances in the Methodology of Grounded Theory*. Sociology Press. University of California, San Francisco.

Glaser, B. G. (1992). *Emergence vs. Forcing: basics of grounded theory analysis*. Sociology Press. Mill Valley, CA.

Glaser, B. G. (1998). *Doing grounded theory: issues and discussions*. Sociology Press, Mill Valley, CA.

Glaser, B.G. & Strauss, A. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago, Aldine.

Goleman, D. (1998). What makes a leader? *Harvard Business Review*, November – December 1998.

Goodman, P.S. (2000). *Missing organizational linkages: Tools for cross-level research*. Thousand Oaks, CA, Sage.

Graham, S. & Weiner, B. (1996) Theories and principles of motivation. In D.C. Berlinger & R.C. Calfee (Eds.) *Handbook of Educational Psychology*. New York: Simon & Schuster Macmillan, pp. 63 – 82.

Gray, D.E. (2007). Facilitating Management Learning. *Developing Critical Reflection through Reflective Tools*. *Management Learning*, Vol. 38, Issue 5, pp. 495 – 517.

Greenberg, J. & Baron, R. A. (2008). *Behavior in organizations*. Ninth Edition. Pearson, Prentice Hall.

Grill, C., Ahlborg, G. & Lindgren, E.C. (2011). Valuation and handling of dialogue in leadership. A grounded theory study in Swedish hospitals. *Journal of Health Organization and Management* Vol. 25 No. 1, pp. 34-54.

Guba, E. & Lincoln, Y. (1994). Competing paradigms in qualitative research. In: Denzin N. & Lincoln, Y. (eds) *Handbook of Qualitative Research*. Sage, Thousand Oaks, CA, pp. 105 – 117.

Hackman, J. R. (2003). Learning more by crossing levels: Evidence from airplanes, hospitals, and orchestras. *Journal of Organizational Behavior*, Vol. 24, pp. 905 – 922.

- Hackman, J.R. & Wageman, R. (2005). A Theory of Team Coaching. *Academy of Management Review*, Vol. 30, No 2, pp. 269 – 287.
- Hamel, G. (2012). *What Matters Now. How to Win in a World of Relentless Change, Ferocious Competition, and Unstoppable Innovation*. Jossey-Bass. Printed in the United States of America.
- Hamel, G. & Green, B (2007). *The Future of management*. Harvard Business School Press.
- Hardagon, A. B. & Bechky, B. (2006). When collection of Creatives Become Creative Collectives: A Field Study of Problem Solving at Work. *Organization Science*, Vol. 17, No. 4, pp. 484 – 500.
- Haslam, S.A., Reicher, S.D. & Platow, M. J. (2012). *Uusi johtamisen psykologia*. University Press. Tallinna, Viro.
- Hassan, O.A.B. (2011). Learning theories and assessment methodologies – an engineering educational perspective. *European Journal of Engineering*, Vol. 36, No. 4, pp. 327 – 339.
- Hawkins, P. (2011). *Leadership team coaching. Developing collective transformational leadership*. Kogan Page Limited.
- Hedberg, B. (1981). How organizations learn and unlearn. In P.C. Nystrom & W.H. Starbuck (Eds.), *Handbook of organizational design*, Vol. 1. Oxford, Oxford University Press, pp. 3 – 27.
- Herr, K. & Anderson, G. L. (2005). *The Action Research Dissertation. A guide for Students and Faculty*.
- Hock, D. (2005). *One to Many. VISA and the Rise of Chaordic Organization*. Berrrett-Koehler Publishers Inc. San Francisco.
- Hogg, M.A. & Tindale, S. (eds.) (2001). *Blackwell Handbook of Social Psychology: Group Processes*. Blackwell Publishing. Printed and bound in Singapore.
- Honey, P. & Mumford, A. (2000). *The Learning styles Helpers's Guide*. Peter Honey Publications.
- Huttunen, R. (2003). *Kommunikatiivinen opettaminen. Indoktrinaation kriittinen teoria*. Kopijyvä Oy. (In Finnish).
- Huysman, M. & De Wit, K. (2002). *Knowledge Sharing in Practice*. Kluwer Academic Publishers.
- Hytinkoski, P., Kiilavuori, T. & Seikkula-Leino, J. (2011). Learning environments of entrepreneur education, in J. Heiskanen, H. Henry, P. Hytinkoski & T. Köppä (Eds.) (2011). *New Opportunities for cooperatives: New Opportunities for People*. Proceedings of the 2011 ICA Global Research Conference, 24–27 August 2011, Mikkeli, Finland.
- Hytti, U. (Ed.) (2002). *State-of-Art of Enterprise Education in Europe – Results from the Entreduproject, Leonardo da Vinci – programme of the European Commission*, Turku.
- Isaacs, W. (1993). "Taking flight: dialogue, collective thinking and organizational learning", *Organizational Dynamics*, Vol. 22 No. 2, pp. 24-40.
- Isaacs, W. (1999). *Dialogue: The art of thinking together*. Doubleday, Randomhouse Inc. Printed in the United States of America.

- Isokorpi, T. (2003). Tunneälytaitojen ja yhteisöllisyyden oppiminen reflektoinnin ja ryhmäprosessin avulla. Hämeen ammattikorkeakoulu. (In Finnish).
- Jacobs, C.D. & Heracleuos, L. Th. (2005). Answers for questions to come Reflective dialogue as enabler of strategic innovation. *Journal of Organizational Change Management*, Vol. 18 No. 4, pp. 338-352.
- Janis, I L. (1982). *Groupthink*. Second edition. Houghton Mifflin company.
- Jacques, D. & Salmon, G. (2007). *Learning in Groups. A handbook for face-to-face and online environments* 4th edition. Routledge.
- Jenkins, J.C. & Jenkins, M.R. (2006). *The 9 disciplines of a facilitator. Leading groups by transforming yourself*. Jossay-Bass. Printed in the United States of America. (e-book).
- Johns, G. (2001). In Praise of context. *Journal of Organizational Behavior*, Vol. 22, pp. 31 – 42.
- Johns, G. (2006). The Essential Impact of Context on Organizational Behavior. *Academy of Management Review*, Vol. 31, No. 2, pp. 386 – 408.
- Johnson D. E. & Johnson F. P. (2003). *Joining Together. Group Theory and Group Skills*, 8th edition. Pearson. Printed in the United States of America.
- Juvonen, P. (2009). Evaluating the Driving Factors and the Suppressing Factors Related to IS Outsourcing in Four Finnish Information Systems Organizations. Presented in ISD (Information Systems Development) conference in Galway, Ireland on 29<sup>th</sup> of August 2007. Published by Springer in 2009.
- Juvonen, P. (2012). *Fostering Entrepreneurship by Developing a New Learning Environment Within a Finnish University of Applied Sciences kirjassa "Entrepreneurship – Born – Made and Educated"*, ISBN 979-953-51-0210-6. Available in: <http://www.intechopen.com/books/entrepreneurship-born-made-and-educated/fostering-entrepreneurship-by-developing-a-new-learning-environment-within-a-finnish-university-of-a>
- Juvonen, P. and Ovaska, P. (2009). Organizational Learning literature visited – Fresh lenses to study practices in ISD organizations? Conference article presented in ISD (Information Systems Development) conference Cyprus on 26<sup>th</sup> of August 2008. Published by Springer in 2009.
- Juvonen, P. & Ovaska, P. (2012) ICT Entrepreneurship Model. A New Approach for Information Technology Bachelor Education. International Stability and Systems Engineering (SWIIS 2012) conference, Waterford, Ireland 11.-13.6.2012.
- Katzenbach, Jon R. & Smith, Douglas K. (1993). *The Wisdom of Teams. Creating the High-Performance Organization*. Harvard Business School Press.
- Katzenbach, J.R. & Smith, D. K. (2001). *The Discipline of Teams. A Mindbook-Workbook for Delivering Small Group Performance*. John Wiley & Sons, Printed in the United States of America.

- Kauffman, C. & Scoular, A. (2004). Toward a Positive Psychology of Executive Coaching. In P. A. Linley & S. Joseph. *Positive Psychology in Practice*, pp. 287 – 302.
- Kelley, R. E. (1992). *The Power of Followership. How to Create leaders People want to Follow and Followers Who Lead Themselves*. Doubleday currency. Printed in the United States of America.
- Kets de Vries, M.F.R. (2007). *Johtaja terapeutin sohvalla*. Edita.
- Kets de Vries, M.F.R. (2011). *The Hedgehog Effect. The Secrets of Building High Performance Teams*. Jossey-Bass. Printed in Great Britain.
- Kew, J., Herrington, M., Litovsky, Y. & Helen Gale, H. (2013). *Generation Entrepreneur? The state of global youth entrepreneurship. Understanding the entrepreneurial attitudes, aspirations and activities of young people*. Available in PDF format in: <http://www.gemconsortium.org/docs/download/2835>
- Kleiner, A. (2008). *The age of heretics. A history of the radical thinkers who reinvented corporate management*. 2nd edition. San Francisco, Jossey-Bass.
- Klenke, K. (2008). *Qualitative Research in the study of Leadership*. Emerald Group Publishing Limited.
- Knoke, D. (2008). *Social network analysis / David Knoke, Song Yang*. Sage Publications.
- Kolb, D. (1984). *Experiential Learning*. Prentice-Hall, Englewood Cliffs, NJ.
- Kopakkala, A. (2005). *Porukka, jengi, tiimi. Ryhmädynamiikka ja siihen vaikuttaminen*. Edita Prima Oy. (In Finnish).
- Kouzes, J.M. & Posner, B.Z. (2007). *The Leadership Challenge*, 4<sup>th</sup> edition. John Wiley & Sons Inc.
- Krogh, G., Ichijo, K. & Nonaka, I. (2000) *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford University Press 2000.
- Kroghfors, L., Kangas, M., Vitikka, E. & Mylläri, J. (2010) *Näkökulmia tulevaisuuden koulupedagogiikkaan 3*. In Smeds, R., Krokfors, L., Ruokamo, H. & Staffans, A. (2010). *Innoschool – välittävä koulu*. Aalto-yliopiston teknillinen korkeakoulu Informaatio- ja luonnontieteiden tiedekunta, Tuotantotalouden laitos, Yritystoiminnan simulointilaboratorio SimLab. Available in PDF format in: [http://innoschool.tkk.fi/framet/InnoSchool\\_kirja.pdf](http://innoschool.tkk.fi/framet/InnoSchool_kirja.pdf) (In Finnish).
- Krueger, N.F. (2000). The cognitive infrastructure of opportunity emergence. *Entrepreneurship theory & practice*, Vol. 24, No.3, pp. 5 – 23.
- Krueger, N.F., Reilly, M.D., Carsrud, L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, Vol. 15, No 5/6, pp. 411 – 432.
- Kujala, T., Krause, C.M., Sajaniemi, N., Silvén, M. Jaakkola, T. & Nyysölä K. (toim.) (2012). *Aivot, oppimisen valmiudet ja koulunkäynti. Neuro- ja kognitiotieteellinen näkökulma. Tilannekatsaus tammikuu 2012. Opetushallitus*. (In Finnish).



- Kultalahti, L., Jokelainen, T., Tensing, M. & Soini, H. (2005) Osallistumisen ja vetäytymisen dynamiikkaa - tutkijan vaihtelevat roolit laadullisessa toimintatutkimuksessa. *Kasvatus* 36 (1), pp. 44 - 51. (In Finnish).
- Kuratko, D. F., Morris, M. H., & Covin, J. G. (2011). *Corporate Innovation and Entrepreneurship* (3rd ed.). Mason, OH: South-Western.
- Kvist, H., Miekkaavaara, A., Poutanen, E-M. (2004). Valmentajan polku. Valmentamalla huippusuorituksiin. Gummerus Kirjapaino Oy. (In Finnish).
- Larson, C.E & LaFasto, F.M. (1989). *Teamwork. What must go right / what can go wrong*. Sage Publications, Printed in the United States of America.
- Lave, J. (1993). The practice of learning. In: S. Chaiklin and J. Lave (Eds.) *Understanding Practice. Perspectives on Activity and Context*. Cambridge, Cambridge University Press.
- Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press 1991.
- Leavitt, H.J. (1996). The Old Days, Hot Groups, and Managers' Lib. *Administrative Science Quarterly*, Vol. 41, pp. 288 – 300.
- Lefstein, A. & Snell. J. (2014). *Better than best practice. Developing teaching and learning through dialogue*. Routledge.
- Lencioni, P. (2012). *The five dysfunctions of a Team. A workshop for teams*. Pfeiffer, A Wiley Imprint.
- Leppimäki, S., Meristö, T., Tuohimaa, H. & Laitinen, J. (2007). *Tulevaisuuden osaamistarpeet tietotekniikkayrityksissä*. Corporate Foresight Group, CoFi/Åbo Akademi. (In Finnish).
- Lepsinger, R. & Lucia, A. D. (2009). *The Art and Science of 360 Degree Feedback*. John Wiley & Sons. Printed in United States of America.
- Leskinen, P-L. 1999: Yrittäjällä on koko elämä kiinni yrityksessä. Opiskelijoiden yrittäjyyskäsitykset ja niiden muutokset yrittäjäprojektin aikana. *Vaasan yliopisto*. No. 71. *Liiketaloustiede* 27. Johtaminen ja organisaatiot. Vaasa.
- Levi, D. (2007). *Group Dynamics for teams*, 2<sup>nd</sup> edition. Thousand Oaks, CA. Sage. Printed in The United States of the America.
- Lincoln, Y. & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA. Sage Publications. Printed in the united states of America.
- Lipman-Blumen, Jean & Leavitt, Harold (1999). *Hot Groups. Seeding them, Feeding Them, and Using Them to Ignite Your Organization*. Oxford University Press.
- Losada, M. (1999). The Complex Dynamics of High Performance Teams, *Mathematical and Computer Modelling*, Vol 30, pp. 130 – 141.

- Losada M. & Heaphy, E. (2004). The Role of Positivity and Connectivity in the Performance of Business Teams. *American Behavioral Scientist*, Vol. 47 (6) pp. 740 – 765.
- Manninen, J., Burman, A., Koivunen, A., Kuittinen, E., Luukannel, S., Passi, S. & Särkkä, H. (2007). Environments that support learning. Introduction to learning environments approach. Helsinki: National board of education.
- Marks, M., Mathieu, J. & Zaccaro, S. (2001). A temporally based framework and taxonomy of team processes, *Academy of Management Review*, Vol. 26, Issue 3, pp. 356 – 376.
- Marquardt, Micheal J. (2002). Building the Learning organization. Mastering the 5 elements of Corporate Learning. Nicholas Breadley Publishing. Printed in the United States of America.
- Marquardt, Micheal J. (2009). Optimizing the power of Action Learning. Solving problems and Building Leaders in Real Time. Davies-Black.
- Marsick, V.J. (2002). Exploring the Many Meanings of Action Learning and ARL – a chapter from Earning while Learning in Global Leadership. The Volvo MiL Partnership. Mil Publishers.
- Maslow, A. (1970). Motivation and personality. Second Edition. Harper & Row publishers.
- Maxell, J. (1992). Understanding and validity in Qualitative research. *Harvard Educational review*, Vol. 62, Issue 3, pp. 279 – 301.
- McGregor, D. (1960). *The Human Side of Enterprise*, New York, McGrawHill.
- McNiff, J. & Whitehead, J. (2010). *You and Your Action Research Project* 3rd edition. Routledge. Printed in Great Britain.
- McNiff, J., Lomax, P. & Whitehead, J. (1996) *You And your action research project*. Routledge, New York.
- Meristö, T., Leppimäki, S., Laitinen, J. & Tuohimaa, H. (2008). Tulevaisuuden osaamistarpeet teknologiateollisuudessa Yhteenvetoraportti toimialakohtaisista yritys-kyselyistä. Teknologiateollisuus ry, ISBN 978-952-12-1926-9, Turku 2008. (In Finnish).
- Mezirow, J. D. (1990). How critical reflection Triggers Transformative Learning. In J.M.A. Associates (eds) *Fostering Critical Reflection in Adulthood: A Guide to Transformative and Emancipatory Learning*. San Francisco, Jossey-Bass.
- Mezirow, J.D. (1991). *Transformative dimensions of adult learning*. San Francisco, Jossey-Bass.
- Michaelsen, L.K., Knight, A.B., & Fink, L.D. (Eds.) (2002). *Team-Based Learning. A Transformative Use of Small Groups*. Preager Publishers, Printed in United States of America.
- Mielityinen, I. (Ed.) (2009). Suomi tarvitsee maailman parasta insinööriosaamista. Tekniikan akateemisten liitto TEK, Forssan Kirjapaino Oy. Available in: <http://www.tek.fi/cmris/browser?id=workspace%3A//SpacesStore/ef5c62fc-bfbf-41b6-93ea-66ef7af37c35&type=popup&caller=widget> (In Finnish).

- Minedu (2014). <http://www.minedu.fi/OPM/Koulutus/ammattikorkeakoulutus/?lang=en> (Accessed on 27<sup>th</sup> of June, 2014). (In Finnish).
- Ministry of Education (2004). Policy for entrepreneurship education. Opetusministeriön julkaisuja 2004:18. (In Finnish).
- Ministry of Education (2008). Koulutus ja tutkimus 2007 – 2012 kehittämissuunnitelma. Opetusministeriö. (In Finnish).
- Ministry of Education (2009). Yrittäjyyskasvatuksen suuntaviivat. Opetusministeriön julkaisuja 2009:7. (In Finnish).
- Mielonen, J. (2011). Making Sense of Shared Leadership. A case study of leadership processes and practices without formal leadership structure in the team context. Dissertation, Lappeenranta University of Technology
- Miles, M. & Huberman, A. (1994). Qualitative data analysis, a sourcebook of new methods. Sage, Newbury Park, CA.
- Morey, D., Maybury, M. & Thuraisingham, B. (eds.) (2000) Knowledge management. Classic and Contemporary Works. The MIT Press.
- Mäki, K. (2012). Opetustyön ammatillaiset ja mosaiikin mestarit Työkulttuurit ammattikorkeakouluopettajan toiminnan kontekstina. Jyväskylä Studies in Business and Economics 109. ISBN 978-951-39-4566-4 (nid.). Jyväskylä University Printing House, Jyväskylä 2012. (In Finnish).
- Nonaka, I. (1991). The Knowledge-Creating Company. Harvard Business Review, November – December 1991. Pp. 96 – 104.
- Nonaka, I. (1994). A dynamic theory of Organizational Knowledge Creation. Organization Science, Vol. 5 No. 1, pp. 14 – 37.
- Nonaka, I., Toyama, R. & Byosiére, P. (2001) A Theory of Organizational Knowledge Creation: Understanding the Dynamic Process of Creating Knowledge. In M. Dierkes, A. Berthoin, A., Child, J. & I. Nonaka (2001). Handbook of Organizational Learning and Knowledge. Oxford University Press.
- Nonaka, I. & Toyama, R. (2003) The knowledge-creation theory revisited: knowledge creation as a synthesizing process. Knowledge Management Research & Practice, Vol. 1 Issue 1, pp. 2-10.
- Nonaka, I. & Takeuchi, H. (1995) The Knowledge Creating Company. How Japanese Companies Create the Dynamics of Innovation. Oxford University Press.
- Nonaka, I. & Toyama, R. (2005) The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis. Industrial and Corporate Change, Vol. 14 Issue 3, pp. 419-436.
- OECD report (2007). Moving Up the Value Chain: Staying Competitive in the Global Economy.
- OECD (2012). Education Today 2013: The OECD Perspective, OECD Publishing.
- Parpei, R. (2008). Business Coaching Itsesäätelyn kehityksinterventiona. Väitöskirja, Teknillinen korkeakoulu, Tuotantotalouden laitos. (In Finnish).

- Patton, M.Q. (2002). *Qualitative Research & Evaluation Methods*, 3rd edition. Thousand Oaks, CA, Sage Publications.
- Pennington, D. C. (2002). *The Social Psychology of Behaviour in Small Groups*. Psychology Press. Printed in Great Britain.
- Pfeffer, J. (1997). *New Directions in Organization Theory*. Oxford University Press.
- Pihkala, J. (2008). Ammattikorkeakoulutuksen aikaiset yrittäjyysintentioiden muutokset. Opetusministeriön julkaisuja 2008:1. Opetusministeriö, Koulutus- ja tiedepolitiikan osasto, 2008. (In Finnish).
- Polyani, M. Kegan, P. (1996). *The tacit dimension*. Routledge.
- Prashnig, B. (2000). *Erlaisuuden voima. Opetustyyli ja oppiminen*. WS Bookwell Oy. (In Finnish).
- Presbury, J., Marchal, J. & Benson, J. (1997). The other side of Knowledge; Avoiding Descartes Error When Managing Knowledge. In J. L. Liebowitz & L.C. Wilcox (Eds.) (1997). *Knowledge Management and Its Integrative Elements*. CRC Press, Boca Raton, New York. Printed in the United States of America.
- Prieto, I.M. & Easterby-Smith, M. (2006). Dynamic capabilities and the role of organizational knowledge: an exploration. *European Journal of Information Systems*, Vol. 15, pp. 500 – 510.
- Proakatemia. Proacademy, [www.proakatemia.fi/en](http://www.proakatemia.fi/en)
- Rajala, A., Hilppö, J. Kumpulainen, K., Tissari, V., Krokfors, L. & Lipponen L. (2010). Merkkejä tulevaisuuden oppimisympäristöistä. *Opetushallitus. Raportit ja selvitykset 2010:3*. (In Finnish).
- Ranne, K. (2009). Ryhmät, ryhmädynamiikka ja tutkivan oppimisen prosessin johtaminen. In H. Heinilä, P. Kalli & K. Ranne (Eds.) (2009). *Tutkiva oppiminen ja pedagoginen asiantuntijuus*. Tampereen ammattikorkeakoulun julkaisuja. Sarja A. Tutkimuksia 15. Okka-säätiön julkaisuja. Painopaikka: Helsinki. (In Finnish).
- Reinhardt, R. (2000). Knowledge management: Linking theory with practice. In D. Morey, M. Maybury & B. Thuraisingham (Eds.) *Knowledge Management. Classic and Contemporary Works*. The MIT Press.
- Resnick, L. B. (1987). The 1987 presidential address: Learning in school and out. *Educational Researcher*, Vol. 16, No. 9, pp. 13 -20.
- Ristikangas, M-R. & Ristikangas, V. (2010). *Valmentava johtajuus*. Wsoy Pro Oy. (In Finnish).
- Rogers, J. (2004). *Aikuisoppiminen*. Tammerpaino Oy. (In Finnish).
- Rogers, J. (2008). *Coaching Skills. A handbook, second edition*. The McGraw-Hill companies. Printed in Great Britain.
- Rohde, M., Klamma, R. & Wulf, V. (2005). Establishing Communities of Practice among Students and Start-up Companies. In T. Koschmann, D. Suthers, & T.W. Chan (Eds.) *Computer Supported Collaborative Learning 2005\_ The next 10 years!* Mahwah, NJ. Lawrence Erlbaum Associates.
- Ruohotie, P. (2005). Self-Regulatory Abilities for Professional Learning. Special Edition of the Finnish Journal of Vocational and Professional Education, pp. 4-10.

- Saarnio, J. & Hamilo, M. (2013). Innovaation alkulähteillä. Teknologiainfo Teknova, Teknologiateollisuus Ry, Suomi. (In Finnish).
- Salas, E., & Fiore, S. M. (Eds.). (2004). *Team cognition: Understanding the factors that drive process and performance*. Washington, DC: American Psychological Association.
- Salas, E., Cooke, N.J. & Rosen, M.A. (2008). On Teams, Teamwork, and Team Performance: Discoveries and Developments. *Human Factors*, Vol. 50, No. 3, pp. 540 – 547.
- Salas, E., DiazGranados, D., Klein, C., Burke, C.S. & Stagl, K.C, Goodwin, G.F. & Halpin, S. M. (2008). Does Team Training Improve Team Performance? A Meta-Analysis. *Human Factors*, Vol. 50, No. 6, pp. 903 – 933.
- Schein, E.H. (1993a). How Can Organizations Learn Faster? The Challenge of Entering the Green Room. *Sloan Management Review*, Vol. 34, No. 2, pp. 85 – 92.
- Schein, E.H. (1993b). On Dialogue, Culture and Organizational Learning. *Organizational Dynamics*, Vol. 22, Summer 1993
- Schein, E.H. (2004). *Organizational Culture and Leadership*. John Wiley & Sons, Inc.
- Schumpeter, J. A. (1990): *Essays on Entrepreneurs, Innovations, Business Cycles, and the Evolution of Capitalism*. Transaction Publishers.
- Schön, D.A. (1983). *The Reflective Practitioner: How Professionals Think In Action*. New York, Basic Books.
- Schön, D.A. (1987). *Educating the reflective practitioner*. New York, Basic Books.
- Schön, D.A. (1994). The Crisis of Professional Knowledge and the Pursuit of an Epistemology of Practice. President and Fellows of Harvard College. Chapter 13, in *Competence in the Learning Society*, John Raven and John Stephenson (eds.), published 2001 by Peter Lang, New York, pp. 185-207.
- Schuman, S. (editor) (2006). *The IAF Handbook for group facilitation. Best Practices from the Leading Organization in facilitation* Jossey-Bass (e-book).
- Schuman, S. (editor) (2010). *The Handbook for Working with Difficult Groups: How They Are Difficult, Why They Are Difficult, and What You Can Do About It.* (e-book).
- Schwartz, M. (2006). For whom do we write the curriculum? *Journal of Curriculum Studies*, Vol. 38, No. 4, pp. 449 – 457.
- Seligman, M.P.E. & Csikszentmihalyi, M. (2000). Positive Psychology. An Introduction. *American Psychologist*, Vol. 55, No 1, pp. 5-14.
- Senge, P. (1990). *The Fifth Discipline – The Art & Practice of the Learning Organization*, Sage, New York.
- Senge, Peter, M. (2006). *The Fifth Discipline Revised and Updated*, Random house 2006. Printed in the United States of America.

- Senge, P., Ross, R., Smith B., Roberts, C. & Kleiner, A. (1994). *The Fifth Discipline Fieldbook*. Nicholas Brealey publishing. Strategies and Tool for Building a Learning Organization.
- Senge, P., Kleiner, A., Roberts, C., Roth, G. & Smith, B. (1999) *The Dance of Change. A Fifth Discipline Fieldbook for Mastering the Challenge of Learning Organizations*.
- Senge, P., Cambron-McCabe, N., Lucas, T. Smith, B., Dutton, J. & Kleiner, A. (2000). *A Fifth discipline resource. Schools that learn*. Randomhouse Inc. Printed in the United States of America.
- Senge, P., Scharmer, C., Jaworski, J. & Flowers, B. (2004). *Presence. Human purpose and Field of The Future*.
- Shane, S. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Northampton, MA: Edward Elgar Publishing.
- Shane, S. & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, Vol. 25, No. 1, pp. 217 – 226.
- Shepherd, D. A., & Douglas, E. J. (1996). *Is Management Education Developing or Killing the Entrepreneurial Spirit*. Paper presented at the Internationalizing Entrepreneurship Education and Training, Arnhem.
- Sibbet, D. (2011). *Visual Teams. Graphic tools for commitment, innovation & high performance*. John Wiley & Sones. Printed in United States of America.
- Sieger, P., Fueglistaller, U. & Zellweger, T. (2014). *Student Entrepreneurship across the Globe: A Look at Intentions and Activities*. St.Gallen: Swiss Research Institute of Small Business and Entrepreneurship at the University of St.Gallen (KMU-HSG). Available in PDF format in:  
[http://www.guesssurvey.org/PDF/2013/GUESSS\\_INT\\_2013\\_REPORT.pdf](http://www.guesssurvey.org/PDF/2013/GUESSS_INT_2013_REPORT.pdf)
- Silverman, D. (1993) *Interpreting qualitative data. Methods for analyzing talk, text and interaction*. London: Sage. Printed in Great Britain.
- Sosa, R. (2011). *Building Innovation Teams with Designers, Engineers and Entrepreneurs. 23 insights from five years of collaboration with faculty members and students from undergraduate and postgraduate studies in Design, Engineering and Entrepreneurship programs at Tec de Monterrey, Mexico*. Special issue of Japanese society for the science of design, Vol 18-1 No. 69.
- Smeds, R., Krokfors, L-, Ruokamo, H. & Staffans, A. (2010). *Innoschool – välittävä koulu. Aalto-yliopiston teknillinen korkeakoulu Informaatio- ja luonnontieteiden tiedekunta, Tuotantotalouden laitos, Yritystoiminnan simulointilaboratorio SimLab*. Available in PDF format in: [http://innoschool.tkk.fi/framet/InnoSchool\\_kirja.pdf](http://innoschool.tkk.fi/framet/InnoSchool_kirja.pdf) (In Finnish).
- Smith, M. K. (2001). Kurt Lewin, groups, experiential learning, and action research. In: *The Encyclopedia of informal education*. Available from: <http://infed.org/mobi/kurt-lewin-groups-experiential-learning-and-action-research/> Accessed on 8<sup>th</sup> of January 2014.

- Smolander, K., Ovaska, P. and Juvonen, P. (2009). The challenges for small software firms in industry globalization, *International Journal of Globalization and Small Business (IJGSB)*, Vol. 3, No. 1, pp.73–89.
- Spinosa, C., Flores, F. & Dreyfus, H. (1997). *Disclosing New Worlds*. MIT Press.
- Steiber, A. & Alänge, S. (2013). A corporate system for continuous innovation: the case of Google Inc. *European Journal of Innovation Management* Vol. 16 No. 2, pp. 243-264.
- Stenholm, P., Kovalainen, A., Heinonen, J. Pukkinen, T. (2012) *Global Entrepreneurship Monitor - Finnish 2012 Report*. A1 / 2013, University of Turku. Available in PDF format in:  
<http://www.gemconsortium.org/docs/download/2891>
- Strauss, A. & Corbin, J. (1997). *Grounded Theory in Practice*. Sage Publications.
- Stringer, E.T. (2007) *Action Research 3<sup>rd</sup> ed.* Sage Publications.
- Suominen, J. (2013). ”Missä on tiimiyrittäjyys?” Yrittäjyyden eetoksen ja yrittäjyyskasvatuksen filosofisten lähtökohtien kriittistä arviointia.” Akateeminen väitöskirja, Tampereen yliopisto, kasvatustieteiden yksikkö. Suomen yliopistopaino Oy. (In Finnish).
- Sydänmaanlakka, P. (2006) *Älykäs itsensä johtaminen*. Talentum. (In Finnish).
- Symon, G. & Cassell, C. (Eds.) (1998) *Qualitative methods and analysis in organizational research. A practical guide*. Sage Publications.
- Säljö, R. (2001). *Oppimiskäytännöt. Sosiokulttuurinen näkökulma*. WS Bookwell Oy, Juva, Suomi. (In Finnish).
- Thomson, M. (2005). Structural and Epistemic Parameters in Communities of Practice. *Organization Science*, Vol. 16, No. 2, pp. 151 – 164.
- Tiimiakatemia <http://www.tiimiakatemia.fi/en/> Accessed on 29th of June 2014.
- Tuckman, B.W (1965). Development sequence in small groups. *Psychological Bulletin*, 63, pp. 348 – 399.
- Tuckman, B. W. & Jensen M. A. (1977). Stages of Small-Group Development Revisited. *Group & Organizations studies* Vol. 2, Issue 4. pp. 419.
- Tuominen, T. (2013). *Innovation and Development Activities in Professional Service Firms. A Role of Structure Perspective*. Doctoral Dissertation, Aalto yliopisto School of Science, Department of Industrial Engineering and Management 16/2013.
- Tyre, M. J. & von Hippel, E. (1997). The Situated Nature of Adaptive Learning in Organizations. *Organization Science*, Vol. 8 No 1, January – February 1997.
- Van Der Vegt, G. S., de Jong, S.B., Bunderson, J.S., Molleman, E. (2010). Power Asymmetry and Learning in Teams: The Moderating Role of Performance Feedback. *Organization Science*, Vol. 21, No. 2, pp. 347 – 361.

Vicari, S., Von Krogh, G, Roos, J. & Mahnke, V. (1996). Knowledge creation through cooperative experimentation. In G. Von Krogh & J. Roos (Eds.): *Managing Knowledge, perspectives on cooperation and competition*, pp. 184 – 202.

Virkkunen, J., Ahonen, H., Schaupp, M. & Lintula, L. (2010) Toimintakonseptin yhteisen kehittämisen mahdollisuus. TYKES, raportteja 70. (In Finnish).

Venkula, J. (2007). *Kysymisen taito*. Kirjapaja, Helsinki. (In Finnish).

Von Krogh, Georg, Ichijo, Kazuo & Nonaka, Ikujiro (2000). *Enabling Knowledge Creation. How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford University Press.

Wang, C.L. & Chugh, H. (2014). Entrepreneurial Learning: Past Research and Future Challenges. *International Journal of Management Reviews*, Vol. 16, pp. 24 – 61.

Wells, G. & Claxton, G. (2002). (eds.) *Learning for life in the 21<sup>st</sup> Century*. Blackwell Publishing. Printed in Great Britain.

Wenger, Etienne (1998). *Communities of Practice. Learning, meaning and Identity*. Cambridge University Press 1998.

Wenger, E., McDermott, R. & Snyder, W. M. (2002). *Cultivating Communities of Practice. A guide to managing knowledge*. Harvard Business School Press 2002.

Wenger, E. (2005). *Communities of practice. Brief introduction*. Cited on 5th of December, 2011.

[http://www.ewenger.com/theory/communities\\_of\\_practice\\_intro.htm](http://www.ewenger.com/theory/communities_of_practice_intro.htm)

Wheelan, S. A. 1994. *Group processes: A developmental perspective*. Sydney: Allyn & Bacon.

Virkkunen, J., Ahonen, H. & Lintula, L. (2008). Uuden toimintakonseptin kehittäminen ammattikorkeakouluun. Muutoslaboratorio yhteisen kehittämisen välineenä. Helsingin ammattikorkeakoulun julkaisuja, Sarja A: Tutkimukset ja raportit 13. (In Finnish).

Vygostky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, Harvard University Press.\*

Yankelovich, D. (1999). *The magic of dialogue: Transforming conflict into co-operation*. London, Nicholas Brearley.

Yin, R. K. (1993) *Applications of Case Study Research*. Thousand Oaks: Sage Publications.

Yin, R. K. (2003) *Case Study Research: Design and Methods*. Thousand Oaks: Sage Publications

YKTT (2013). *Yrittäjyyskasvatuksen aikakauskirja*. Periodical of Entrepreneurship Education 1/2013. ISSN 2342-4281 (Painettu / Printed), ISSN 2342-429X (Verkkojulkaisu / PDF).

Ylä-Anttila, P. (2012). Sähkö-, elektroniikka- ja tietotekniikka-ala. Tuotantoketjut hajautuvat, osaamistarpeet muuttuvat. *Keskusteluaiheita, Discussion Papers*, 29.5.2012. ETLA, Opetushallituksen toimeksiannosta laadittu taustaselvitys alan kehitykseen ja osaamistarpeisiin vaikuttavista muutostekijöistä. (In Finnish).

Zander, A. (1994). *Making groups effective*. San Francisco. Jossey-Bass.



## 9. Appendices

### 9.1 Appendix 1: First round interview questions

#### Basic information and current situation

1. Name of the interviewee, place and date
2. Describe your current actions with your team members
3. What kind of expectations do you have about the ICT entrepreneurship study path?
4. Do you have any dream job? If you do, what would it be?
5. What kind of:
  - a. Possibilities do you see related to team entrepreneurship?
  - b. Risks / challenges do you see related to team entrepreneurship?
6. Could you name issues that you are currently satisfied with?
7. Could you name issues needing development right now?
8. How do you see your own role as a team member currently?
  - a. Are you satisfied with your role? (Why? / why not?)

#### Future

9. How do you see the future of your cooperative?
  - After one year?
  - After three years?
  - After five years?

#### Internal and external communication

10. Could you describe the amount of communication between you and other team members? (Scale 0= no communication, 5 = continuous communication?)

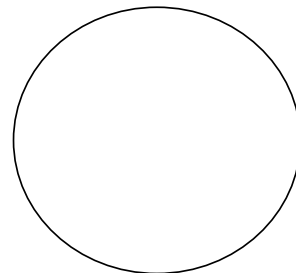
#1		#7	
#2		#8	
#3		#9	
#4		#10	
#5		#11	
#6		#12	

11. Could you name persons or stakeholders groups outside your team you find important?
12. Would you like to discuss any other issues?

## 9.2 Appendix 2: Second round interview questions

### Basic information and current situation

1. Name of the interviewee, place and date
2. How do you feel right now? (check-in)
3. How many customer projects do you have going on in parallel?
  - a. What kind of objectives do you have with the projects?
4. Could you describe the first project you sold to the customer by yourself?
  - a. Who were involved?
  - b. What succeeded?
  - c. Were there any failures?
  - d. How much revenue did you make?
  - e. What did you learn from it?
5. Does your cooperative have any challenges right now?
  - a. If so, what kind?
6. What about your personal challenges?
7. Have you set any personal goals?
  - a. If so, what kind?
  - b. Do you measure how you proceed with your goals?
  - c. Have you achieved your goals?
8. Do you have any mutual goals in your cooperative?
  - a. If so, what kind?
  - b. Do you measure how you proceed with your goals?
  - c. Have you achieved your goals?
9. Where do you get energy?
10. What about the other side of the coin, is there anything that is not going as you would hope?
  - a. Is there anything that you could do about it?
  - b. What do you think about commitment in your cooperative (question emerged based on theoretical sampling)?
11. Could you name practices in your cooperative with which you are currently satisfied with?
12. Could you name practices in your cooperative where there would be immediate place for development?
13. How do you see your own role as a team member currently?
  - a. Are you satisfied with your role? (Why? / Why not?)
14. How do you divide your time between multiple tasks such as conventional courses, projects, reading books, hobbies, etc.? (estimate shares to the circle)



**Future**

15. How do you see the future of your cooperative?

- After one year?
- After three years?
- After five years?

**Internal and external communication**

16. Could you describe the amount of communication between you and other team members? (Scale 0= no communication, 5 = continuous communication?)

#1		#7	
#2		#8	
#3		#9	
#4		#10	
#5		#11	
#6		#12	

17. Could you name persons or stakeholder groups outside your team you find important?

18. Critical incidents

- a. Can you recall any remarkable good incidents (top 5 %) during the last few months?
- b. Can you recall any remarkable frustrating incidents (lowest 5 %) during the last few months?

19. Would you like to discuss any other issues?

## 9.3 Appendix 3: Third round interview questions

### Basic information and current situation

1. Name of the interviewee, place and date
2. How do you feel right now? (check-in)
3. Your cooperative has been operating about 18 months now. You are about half the way. What do you think about that?
4. How many customer projects do you have going on in parallel?
  - a. How many new projects have you got during the last few months?
  - b. How many projects are you involved with currently?
  - c. How do your current projects differ from the projects you had in the beginning?
5. What kind of risks are involved into your operations?
6. Does your cooperative have any challenges right now?
  - a. If so, what kind?
7. What about your personal challenges?
8. Have you set any personal goals?
  - a. If, what kind of?
  - b. Do you measure how you proceed with your goals?
  - c. Have you achieved your goals?
9. Do you have any mutual goals in your cooperative?
  - a. If so, what kind?
  - b. Do you measure how you proceed with your goals?
  - c. Have you achieved your goals?
10. Where do you get energy?
11. What about the other side of the coin, is there anything that is not going as you would hope?
  - a. Is there anything that you could do about it?
  - b. What do you think about commitment in your cooperative (question emerged based on theoretical sampling)?
12. Could you name practices in your cooperative which you are currently satisfied with?
13. Could you name practices in your cooperative where there would be immediate place for development?

### Future

14. How do you see you cooperative after:
  - a. Half a year?
  - b. One and a half years?
15. Critical incidents
  - a. Can you recall any remarkable good incidents (top 5 %) during the last few months?
  - b. Can you recall any remarkable frustrating incidents (lowest 5 %) during the last few months?
16. Would you like to discuss any other issues?

## 9.4 Appendix 4: Interview questions for team entrepreneurs who decided to leave the ICT-ESP

### **Basic information and current situation**

1. Name of the interviewee, place and date
2. How do you feel right now? (check-in)
3. Can you name any specific incidents which affected your decision to leave the ICT-ESP?
4. How did you see yourself as a team entrepreneur?
  - a. How much did you spend on your comfortable zone?
  - b. Did you challenge yourself?
5. Would you like to give feedback about general arrangements of the ICT-ESP?
6. Are there any other issues you would like to discuss?

## 9.5 Appendix 5: Presentation of the cooperatives

Cooperative	Amount of team entrepreneurs (originally)	Role in the study
Icaros (IT students)	12	Theme based interviews and direct observation
Ideatech (IT students)	12	Theme based interviews and direct observation
Aedo Group (IT students)	12	Theme based interviews and participative observation
Setentia (marketing students)	16	Participative observation (comparisons made to IT cooperatives)

In each cooperative 3 – 4 team entrepreneurs formed a management board together with the team coach. The management board operated for 6 – 8 months and after that the team entrepreneur members were changed.

## THE RESEARCH SECTION

## **Publication I**

Originally published in European Journal of Engineering Education (EJEE) Vol. 38, No 2, pp. 186-193, with permission of Taylor & Francis.





## **Learning to fly? First experiences on team learning of Icaros cooperative**

Pasi Juvonen\*

*Saimaa University of Applied Sciences, Lappeenranta, Finland*  
(Received 27 January 2012; final version received 14 December 2012)

Icaros is an information technology (IT) cooperative that was originally owned by 11 IT degree programme students of Saimaa University of Applied Sciences. This article describes experiences and challenges of team building of these students who are called 'teampreneurs' during their first year as team entrepreneurs. The findings provided here are based on theme-based interviews and direct observations. The team learning experiences gained during their first year were related to lack of risks and challenges in team building. Previous studies related to team development suggest that cooperation and conflict, and also openness and confrontation, are essential elements for team development. Based on the findings, teampreneurs of Icaros were avoiding confrontation and conflict. These facts inhibited their development to a potential team and they were stuck in the pseudo-team stage with several parallel challenges. Later, after four teampreneurs decided to leave the Icaros cooperative, it created a crisis within the team and the Icaros was able to further develop as a team. The results suggest that team building needs lots of time and patience and cannot be hurried. Furthermore, the role of team coach is crucial in supporting the teampreneurs to confront their challenges related to relationships between each other within the team.

**Keywords:** team learning; teampreneur; cooperative; team development; qualitative research

### **1. Introduction**

Nowadays change is ongoing and rapid. Entire domains of industry may collapse in a few years and new businesses seem to emerge from nowhere. Due to ongoing change, learning has become a crucial asset for an organisation's success or even survival. The rapidly escalating change requires new types of organisations, in which continuous learning is seen as an essential asset (Easterby-Smith, Burgoyne, and Araujo 1999; Marquardt 2002, 2009). These changes have also affected the academic world. Educators all over the world have to consider how to equip university students with appropriate skills that give them the opportunity to be successful during their studies and after they have graduated. Instead of giving them existing knowledge, environments should be created where students will want to learn (Senge et al. 2000). Nowadays, the concept of a team is the basic unit of working and learning and therefore it is essential to build learning environments that will support team learning. These ideas presented are not new. However, they have not been applied in practice to Bachelor degree education in Finland before 1993. In 1993 Tiimiakatemia at Jyväskylä, Finland, started Bachelor degree education in marketing with team learning methods. The Tiimiakatemia has currently been operating for 18 years and it is a unit of education specializing in entrepreneurship (Partus methods 2011).

IT Bachelor students in Saimaa University of Applied Sciences study their first academic year in the conventional way. They study mathematics, languages and basics of IT. During their first academic year students can choose from three different study paths: international team learning; project learning; ICT entrepreneurship. If they choose to continue their studies in ICT entrepreneurship, they will establish a company (cooperative) at the end of their first academic year together with other students who have chosen the same study path. These students, called 'teampreneurs', own the company and are fully responsible for running it. The teacher's role is to act as their mentor and as a team coach. Based on the researchers' current best knowledge and literature review, teampreneurship, in which team learning methods are utilized, has not been deployed in IT Bachelor education before. The cooperative as a form of a company helps students to mitigate the risk of being an entrepreneur and to deal with money gained from customer projects. Above these basic issues, the cooperative uses team learning methods that provide a practice-oriented way to study IT. The teampreneurs' way of studying consists of three essential elements: reading books (theory); doing projects for their customers (practice); try-outs (knowledge sharing). In try-outs, teampreneurs reflect on what they have learned from the books and within the projects and how they could benefit from the gained knowledge in future operations of their company (and studies). This kind of learning environment could be seen as a potential learning organisation (Senge 1990; Senge et

al. 1994, 2000) where organisational knowledge creation and knowledge sharing would become common practices (Nonaka 1994).

## **2. Definition of concepts**

### **2.1. Definition of a team and stages of team development**

Katzenbach and Smith define a team as: 'A small number of people with complementary skills who are committed to a common purpose, performance goals, and approach which they hold themselves mutually accountable' (Katzenbach and Smith 1993, 45). Furthermore, few groups become real teams without taking risks to overcome individual, functional and hierarchical boundaries (Katzenbach and Smith 1993, 25). Team development starts when individuals start working together as a working group. In a working group, individuals usually have personal goals and responsibilities. A working group can be an appropriate structure for tasks where problems solved are not complex. A pseudo-team is a group of individuals who call themselves a team but do not meet the criteria of a team. Pseudo-teams usually lack in performance compared to working groups. A potential team has a common purpose and its goals and working approach have been agreed. This requires that individuals have been able to give up their personal goals and they have committed to team goals instead. Real team means that its members are truly committed to a common purpose, shared goals and working approach for which they hold themselves mutually accountable. A high-performance team meets all the conditions of a real team. Based on the literature, high-performance teams are not very common.

### **2.2. Lifecycle of a group (or team)**

Originally, the team lifecycle had four stages: forming; storming; norming; performing. (Tuckman 1965; Tuckman and Jensen 1977) After several studies were conducted in the healthcare sector, especially with therapy groups, a fifth stage, adjourning, was added. In the forming stage, group members orientate and test rules for task and interpersonal behaviour of the group. Polarisation of group members, conflicts and resistance related to group influence are typical for the storming stage. In the norming stage, resistance and conflicts are won and the group is ready to agree on new standards and roles. Group members feel confident to express intimate personal opinions. Finally, in the performing stage, interpersonal structure (real team) becomes the tool of task activities (Tuckman 1965, 396).

### **2.3. Knowledge creation and knowledge sharing**

Knowledge – a justified true belief – has been separated into explicit knowledge and tacit knowledge. Explicit knowledge can be learned from books or other similar sources. Tacit knowledge will be expanded through an individual's experiences. Nonaka defines knowledge creation as a spiraling process between explicit and tacit knowledge. This interaction will create new knowledge (Krogh, Ichijo, and Nonaka 2000). Organisational knowledge is created through a continuous dialogue between tacit and explicit knowledge. Four patterns of interactions, socialization (sharing and creating tacit knowledge through direct experience), combination (combining explicit knowledge with the help of information systems), internalization (converting explicit knowledge to tacit knowledge through practice) and externalization (converting tacit knowledge to explicit knowledge through dialogue and reflection) are used to implement organisational knowledge creation. These stages (socialization, externalization, combination, and internalization) are also known as the SECI process (Nonaka 1994; Nonaka and Toyama 2003).

### **2.4. Learning organisation**

According to Senge, many organisations have been paralyzed in their ability to learn. One of the most common reasons for this situation is that many employees will lose their commitment, the sense of mission and excitement with what they are doing (Senge 1990). To avoid the situation described earlier, Senge presents five disciplines and how they are combined together to create a learning organisation: (1) systems thinking; (2) personal mastery; (3) mental models; (4) building shared vision; (5) team learning. Systems thinking is defined as an ability to see invisible fabrics, patterns of behaviour and connections between interrelated actions. It is the ability to see the conceptual framework of 'what is happening'. Mental models are everyone's hidden assumptions that affect how people think and act and one way to diminish their effect is trying to make them visible through dialogue (Isaacs 1999). Building a shared vision deals with a 'picture of the future', where do the team or group want to go? Team learning is crucial because the team has for a long time been the basic unit of learning. Team learning deals with patterns of defensiveness and tries to bring them to surface to get rid of them. By practicing discussion it is, in the long run, possible to achieve extraordinary results by really thinking together (Senge 1990, 1996; Senge et al. 1999; Isaacs 1999).

### **2.5. The research questions**

After studying previous research related to learning organisation and considering the situation of the Icaros cooperative, two research questions were selected:

**Q1:** What kind of learning experiences have teampreneurs of Icaros cooperative gained during their first customer projects?

**Q2:** How could the development process of the team studied be described?

### **3. Description of research process**

Data for the article were collected between April 2010 and February 2012 and consisted of theme-based interviews and observation of team learning sessions. The teampreneurs of the first cooperative Icaros were interviewed three times between April 2010 and February 2012. To be able to make comparisons, teampreneurs of the second cooperative Ideatech were also interviewed. A total of 37 theme-based interviews were conducted. Interviews lasted from 30 to 120 minutes. To be able to verify how interviewees express their arguments and emotions in team learning sessions, a total of 22 team learning sessions were observed between May 2010 and May 2012. These team learning sessions lasted from two to eight hours. The author was also able to access an information repository used by Icaros and follow the written documentation made by the teampreneurs and their coach. The findings have been discussed and validated with the Icaros team coach, who works in the same degree programme with the author.

The interviews were analyzed utilizing grounded theory (Strauss and Corbin 1997; Corbin and Strauss 2008) and case study (Yin 2003; Flick 2009) methods. According to Flick, qualitative research is of specific relevance to the study of social relations (Flick 2009, 12). For this study qualitative methods were selected as they were able to build a richer description of the phenomena studied. The grounded theory analysis started with an open coding phase. In the open coding phase the researcher 'let the data speak for themselves' meaning that the research question is used as a lens to read the interview data. Everything that seems to give some explanation to the research question will be marked as an interesting phenomenon. The open coding phase was based on a certain seed category that meant interesting phenomena related to selected research questions. Elements of team development served as a seed category for this study. Based on the methodological instructions related to the grounded theory method, the data collection should be continued at least until the data are saturated; in other words, extra interviews would not add anything remarkable or new information on the data (Corbin and Strauss 2008). After 11 theme-based interviews the seed category was already well saturated. During the open coding phase new categories emerged. Interviewees expressed the view that future challenges and risk taking seed categories were very close to each other.

The open coding phase was followed by an axial coding phase, which in practice went on almost in parallel with the open coding phase. During the axial coding phase the observations were grouped and relations between them were analyzed. During open coding and axial coding phases, theoretical sampling (Denzin 2003; Corbin and Strauss 2008) was used (both with interviews and observation) to get a better understanding of the interesting phenomena and their relations expressed by teampreneurs. Theoretical sampling based on the data guided further data collection. Some new seed categories, such as customer visits and shared goals and working approach, were established during the study based on theoretical sampling. When a new interesting phenomenon was found, it was further studied by further interviews and observation. The previously collected data were also reflected from the viewpoint of the new seed category.

The last phase of the analysis was selective coding. In the selective coding phase the core of the results was formed, and 'a story of the case' (Flick 2009) was written. After selective coding it was possible to say what was going on with teampreneurs from the viewpoint of the research questions. After analyzing the data another category emerged during the selective coding phase. It became evident that teampreneurs were discussing lack of courage and overcoming fear and it prevented them from offering customers more challenging projects. They also avoided expressing their frustration on the lack of disciplined working approach. The lack of courage and overcoming fear formed the core category of the study.

Critical incident technology (CIT) is a qualitative analysis method that helps researcher to dig into critical positive and negative incidents that have happened to interviewees based on their own words (Symon and Cassell 1998). With CIT research might capture the most critical positive and negative experiences and separate them for further analysis. CIT was used during theme-based interviews to help interviewees to recall and reflect their experiences.

### **4. Observations on learning experiences**

During the theme-based interviews teampreneurs were asked about their experiences from first customer projects and their opinion on teampreneurs' shared practices. In addition, they were asked about any success stories and pitfalls they may have encountered. Most of the interviewees also expressed issues related to team cohesion and team development when discussing other issues. The most remarkable learning experiences from the first customer projects were related to scheduling time between multiple projects. Two expressions related to the learning experiences are presented below.

"A: Now when we have already started we should observe scheduling of our work. We should not allow deadlines that are far away ahead. We could do more projects and learn faster. In addition, we should find more challenging projects, and we should be thinking that already."

"A: We should have more projects. We should learn to balance your resources and decide how many projects we can have at the same time and in queue."

When discussing success stories and pitfalls, several teampreneurs expressed that there were none and they felt that it meant that they have not taken any risks at all. It also became evident that teampreneurs' future challenges were tightly connected to risk taking and courage to challenge them for offering something that they are not already able to carry out. Here are some expressions related to the theme:

"A: We should take more risks. We cannot develop if our deadline for web pages is three months from now. Q: Would you need more pressure? A: In principle, yes."

"A: Bigger the risk is, bigger the possibility to make profit. Of course we should have some sanity, but we shouldn't stay in safe zone only because we want to increase balance of our bank account."

"A: So far customer projects have not been very challenging. We should offer more services that we don't know yet how to implement."

Teampreneurs lack examples of personal risk taking. If someone showed an example, the others might follow that example. The significance of risk taking was emphasized in almost every interview and in several team learning sessions but no evidence of risk taking in actions was gained. The challenges related to team development and concern for cohesion of the team were also expressed by several teampreneurs:

"Q: Have you spoken about these repeated absences together or is this subject a taboo? It is somehow a taboo, in some point we have to discuss about them. Maybe we are just trying to move it later because we don't know how it affects to atmosphere and motivation. This first year has been in a way a year of adaption. A: Sometimes it is frustrating when it feels, that not everyone is not quite giving the effort they could, and would be able to. Everyone is not committed . . . lot of time is used for unnecessary issues."

"A: A crisis will come sooner or later but it is easier to move forward and hope that something will happen and change the situation . . . It is also possible that cooperative will be smaller after that."

When discussing learning experiences, it also became evident that most of the learning has so far happened at an individual level. Some experiences had been shared within the project group but not with the whole team. Most of the teampreneurs felt that they were not sharing their experiences. Teampreneurs were also asked about shared goals and working approach. The following citations describe how interviewees saw the situation:

"Q: Does Icaros have any shared practices that everyone knows and follows? A: I don't think we have. We have not drawn any guidelines to your actions."

"Q: Do you measure how you achieve your goals? A: Every month. Q: What will happen if you find out that something did not succeed? A: That the question, that will cause nothing. It is easy to see that teampreneurs are not committed to the goals. A: Well, we should but we don't. Maybe everyone just thinks someone else will take care of it."

Table 1. Summary of the observations

Seed category	Interpretation
Learning experiences	First experiences on time scheduling have set a baseline for future projects.
Risk taking	Risks should be taken to guarantee versatile projects and learning. Examples of personal risk taking are missing. Risk taking and future challenges are tightly connected.
Customer visits	Teampreneurs seem to avoid challenging themselves for customer visits by any means.
Team development	Icaros is currently a working group. Some elements of a pseudo-team seem to already exist. There was not much evidence of mutual trust.
Shared goals and working approach	Some teampreneurs are committed to goals and some of them are not. It seems that several excuses are used to avoid discussion on the team's performance. A disciplined working approach is missing at present.
Lack of courage and overcoming fear	Planning (socialisation and externalization) and actions (combination and internalization) are not balanced. The teampreneurs have expressed the view that they tend to plan actions with enthusiasm but lack courage to put the plans into practice. Based on the interviews and observations, lack of courage seemed to be related to lack of trust between teampreneurs.

According to Katzenbach and Smith (1993) one of the essential elements for building a real team is a mutually agreed and disciplined working approach. The shared and disciplined working approach will make knowledge creation and knowledge sharing possible. Continuous knowledge creation and knowledge sharing fosters learning, which is one of the reasons why teams are used in learning. So far, there is not much evidence of any common working approach. A summary of the observations is presented in Table 1.

## 5. Discussion

Teampreneurs have noticed that they have to develop new competencies and therefore take more risks to find more challenging projects. This will require that they will agree on performance goals and commit to achieve them by taking action. One has to be ready to feel uncomfortable, incompetent, vulnerable and even distressed. Shared practice with a challenging objective will also create circumstances for mutual trust to develop.

The observations related to team development and shared goals are quite common and the findings are supported by the corporate learning dilemma (Argyris and Schön 1996, 64–72). The corporate learning dilemma suggests that individuals tend not to reflect any issues underlying the ongoing problems or challenges. In that way they remain in a single-loop learning mode, where they try to solve problems without questioning underlying issues. For the single-loop learning mode it is typical that there is no public discussion of sensitive issues, any discussion that might cause negative feelings or feeling blamed are avoided and the taboo of public confrontation is enforced. Unfortunately, that will lead to underperformance and lack of trust and respect.

After their first year, Icaros could have been described as a working group or pseudo team. Teampreneurs called themselves a team but they were lacking several elements that potential teams have. For every team a unique balance between action and patience is needed. This requires that the team leader will sense when to wait and when to push. Katzenbach and Smith (pp. 119–125) highlight the very beginning of the team development, where every participant will pay attention to those in authority. Initial impressions are made and ongoing assumptions and concerns are confirmed, suspended or dispelled. What leaders do is more important than what leaders say. Basic rules of conduct should be immediately set and implemented. The most crucial rules pertain to attendance to group actions.

Icaros' teampreneurs were stuck. Katzenbach and Smith (1993, 168) suggest that for stuck teams the best way to get unstuck is to concentrate – as a team – on performance. Team members have to set challenging goals and sense they are mutually accountable to achieving them. As long as problems were avoided, it prevented Icaros going beyond the pseudo team stage. There were solo players in the team, and it prevented mutual accountability to develop. Those who are in leading roles within the team should not be afraid of conflicts and confrontation because those are important stages of team development. Based on the results gained from two teams, Icaros and Ideatech, entering the storming phase requires lot of facilitation or even push from the team coach.

When the journey of Icaros, their second year as teampreneurs, was further followed by the author in autumn 2011 it became evident that Icaros as a team had really moved into the storming phase. During autumn 2011 four teampreneurs decided to leave the Icaros cooperative. The resignation of these four teampreneurs occurred during a very short time and it caused chaos and started a crisis that was waiting to happen. A few months later, in the interviews the remaining seven teampreneurs expressed the view that the cohesiveness of team had greatly increased and trust between teampreneurs had developed after the four teampreneurs had left. The Icaros teampreneurs felt that they were able to confront the challenging issues more easily as they were with no excuses or avoidance.

## **6. Summary**

This study is a part of an ongoing study where development of the new learning environment for IT Bachelor degree education at Saimaa University of Applied Sciences is followed. This article focused on describing the first team's learning experiences and team development of the Icaros cooperative. This study suggests that the Icaros teampreneurs have reached the point where crucial decisions related to their teams' future prevail. Depending on the decisions made Icaros may remain as a working group or a pseudo team or little by little transform to a community of practice. The Icaros can also develop into a real team or even a high-performing team but that will probably not happen without building trust, negotiating shared goals and sensing mutual accountability on performance goals. The latest results suggest that Icaros is moving ahead from the pseudo team phase to a potential team phase.

Icaros' first year was a year of unlearning the conventional school system. Teampreneurs were challenged to start a business from nothing and they have in some way succeeded without any pre-existing brand or references. Their first projects have been huge learning experiences for them. Icaros' second year has been storming and forming and eventually during the third year there will be a possibility to really perform as a team. Seeds for the crisis existed after their first year and the crisis escalated rapidly in the beginning of their second year. So far the development of the team follows the path that has been reported in previous studies on the same subject. For those who want to utilize team learning methods, this study suggests that a lot of patience is needed. Team building requires lot of time and space and cannot be hurried. The choices are either to decide to trust that something will come up from the team building process – or do not even try it. In other words, one cannot come to a 'semi-solution', where there would be some elements of education carried out in the conventional way and other parts done with team learning methods. To put it simply, one either trusts the process or not.

At the beginning of the team learning experiment the focus had to be on team building and the group dynamics of the team. Something a team coach can and should do is to make teampreneurs confront their challenges over and over again. Finally, it is naturally up to teampreneurs themselves to confront their challenges but with the support of a more experienced team coach it will be easier. Based on the results from study, teampreneurs from both of the teams (Icaros and Ideatech) felt that they needed support from the team coach to cope with the complex issues related to group dynamics. After 18 months of team building it seems Icaros cooperative is now able to concentrate more on performance than team building. The team building will go on as long as the teampreneurs are working together but it will not need as much energy as it did before.

### Acknowledgements

The author wants to thank all the Icaros' and Ideatech's teampreneurs for allowing him to observe their journey. I am also grateful for the coach of Icaros for numerous and sometimes even emotional discussions on coaching and developing the learning environment that we have developed in cooperation with other colleagues.

### References

- Argyris, C., and D. Schön. 1996. *Organizational learning II: Theory, Method and Practice*. Reading, MA: AddisonWesley.
- Corbin, J., and A. Strauss. 2008. *Basics of Qualitative Research 3 e: Techniques and Procedures for Developing Grounded Theory*. Thousand Oaks, CA: Sage.
- Denzin, N. K., and Y. S. Lincoln, eds. 2003. *Collecting and Interpreting Qualitative Materials*. Thousand Oaks, CA: Sage.
- Easterby-Smith, M., J. Burgoyne, and L. Araujo, eds. 1999. *Organizational Learning and the Learning Organization*. London: Sage.
- Flick, U. 2009. *An Introduction to Qualitative Research*. 4th ed. London: Sage.
- Isaacs, W. 1999. *Dialogue: The Art of Thinking Together*. New York: Doubleday.
- Katzenbach, Jon R., and Douglas K. Smith. 1993. *The Wisdom of Teams. Creating the High-Performance Organization*. Harvard, MA: Harvard Business School Press.
- Krogh, G., K. Ichijo, and I. Nonaka. 2000. *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. New York: Oxford University Press.
- Marquardt, Micheal J. 2002. *Building the Learning Organization. Mastering the 5 Elements of Corporate Learning*. Palo Alto, CA: Nicholas Breasley.
- Marquardt, Micheal J. 2009. *Optimizing the Power of Action Learning. Solving Problems and Building Leaders in Real Time*. Mountain View, CA: Davies-Black.
- Nonaka, Ikujiro. 1994. "A Dynamic Theory of Organizational Knowledge Creation." *Organization Science* 5 (1): 14–37.
- Nonaka, I., and R. Toyama. 2003. "The Knowledge-Creation Theory Revisited: Knowledge Creation as a Synthesizing Process." *Knowledge Management Research & Practice* 1 (1): 2–10.
- Partus methods. Accessed 28 January 2011. <http://partus.fi/partus-oy/partus-english>
- Senge, P. 1990. *The Fifth Discipline – The Art & Practice of the Learning Organization*. New York: Sage.
- Senge, P., N. Cambron-McCabe, T. Lucas, B. Smith, J. Dutton, and A. Kleiner. 2000. *Schools That Learn: A Fifth Discipline Fieldbook for Educators, Parents, and Everyone Who Cares About Education*. New York: Doubleday.
- Senge, P., C. Roberts, R. Ross, B. Smith, G. Roth, and A. Kleiner. 1999. *The Dance of Change: The Challenges of Sustaining Momentum in Learning Organizations*. A Fifth Discipline Resource. London: Nicholas Breasley.
- Senge, P., R. Ross, B. Smith, C. Roberts, and A. Kleiner. 1994. *The Fifth Discipline Fieldbook: Strategies for Building a Learning Organization*. London: Nicholas Breasley.
- Senge, Peter M. 2006. *The Fifth Discipline: The Art & Practice of The Learning Organization* (revised and updated). New York: Random House.
- Strauss, A., and J. Corbin, eds. 1997. *Grounded Theory in Practice*. Thousand Oaks, CA: Sage.
- Symon, G., and C. Cassell, eds. 1998. *Qualitative Methods and Analysis in Organizational Research. A Practical Guide*. London: Sage.
- Tuckman, B. W. 1965. "Development Sequence in Small Groups." *Psychological Bulletin* 63: 348–399.
- Tuckman, B. W., and M. A. Jensen. 1977. "Stages of Small-Group Development Revisited." *Group & Organizations Studies* 2 (4): 419.
- Yin, R. K. 2003. *Applications of Case Study Research*. Thousand Oaks, CA: Sage.

### About the author

*Pasi Juvonen* is a Lecturer and Researcher specializing in the fields of Organisational Learning and Learning Organisation. He has a MSc degree (Eng.) from the Lappeenranta University of Technology, Finland. He is also a PhD student and he has been actively writing about his research topics. He has also participated in the programme committee of the Information Systems Development conference.

## **Publication II**

Published originally in T. Burger-Helmchen (Ed.): Entrepreneurship – Born – Made and Educated, ISBN 979-953-51-0210-6. InTech, Printed in Croatia, pp. 225 – 246, with permission of InTech.





# Fostering Entrepreneurship by Developing a New Learning Environment within a Finnish University of Applied Sciences

Pasi Juvonen  
Saimaa University of Applied Sciences,  
Finland

## 1. Introduction

The rapidly escalating change requires new types of organizations, in which the continuous learning is seen as essential asset for organizations success (Marquardt 2002, 2009; Senge 1990, 2006; Easterby-Smith et al, 1999). The sooner the learners are familiar with ongoing change and the principle of lifelong learning the better they are able to succeed with their studies and their future career. Educators all over the world have to consider how to provide university students with appropriate skills that give them an opportunity to be successful during their studies and also after graduation. To be honest, no one exactly knows what will be the challenges we have to deal with in a couple of years. The need of new type of organizations, hot groups and innovative learning methods has been emphasized also in management and business literature (c.f. Lipman-Blumen & Leavitt 1999; Hamel & Green 2007; Marquardt 2009).

Instead of only transferring existing information to the students, we should create learning environments where the students will want to take own responsibility for their learning by themselves by creating knowledge via shared practice. Furthermore students can build their self-confidence by taking risks in within an environment where there will be no real financial loss in case of failure. Within these learning environments learning will take place by methods the learners will find useful, within a cooperative which they own by themselves, or within a project group. In both cases, the students study theory by reading books and apply the knowledge by carrying out projects for customer companies. Studying is supported by teachers who act as mentors and coaches. Learning by doing is emphasized in these kinds of learning environments. The teachers' role and responsibility will be in this kind of learning environment to facilitate learning by maintaining and further developing the learning environment.

This article will present how a learning environment that fosters entrepreneurship is being created for Information Technology (IT) Bachelor education in Saimaa University of Applied Sciences (SUAS). The study has been started in February 2010 and it will continue until December 2013. There are no final results available at this stage, however, some observations related to learning experiences of students utilizing team learning methods can already be shared. The study will also suggest that entrepreneurship can be supported by developing a learning environment where students can select learning with the methods that they feel appropriate for themselves.

### 1.1 Motivation for the study

The primary objective for developing the learning environment has been to better prepare the IT bachelor students for challenges of ongoing change that they will meet during their future careers. Lenses used for the study are:

*How could we foster entrepreneurship by developing learning environment for IT Bachelor education?*

This will also serve as a research question.

The Finnish Ministry of Education and Culture (former Finnish Ministry of Education) has set the objectives for supporting entrepreneurship in Finnish Universities at national level (Ministry of Education 2003; 2004; 2009). The author has translated the objectives based on the original Finnish materials. A summary of the objectives set by the Ministry of Education and Culture is presented here:

- University level entrepreneurship is encouraged by integrating entrepreneurship broadly to studies at Universities of Applied Sciences. (Ministry of Education 2004, p. 23)
- The Universities of Applied Sciences will act as cooperation coordinators between students and working life and will see to that cooperation will be systematically deepened during university studies (Ministry of Education, 2008, p. 50)
- Promotion of internal and external entrepreneurship, the creation of new business, and innovation. (Ministry of Education 2009, p. 14)
- Creation of an entrepreneurship culture and a mindset and climate conducive to entrepreneurship. (Ministry of Education 2009, p. 14)

To define “entrepreneurship” the following definition by European Commission is used:

“Entrepreneurship refers to an individual's *ability to turn ideas into action*. It includes *creativity, innovation and risk taking*, as well as the *ability to plan and manage* projects in order to *achieve objectives*. This supports everyone in day to day life at home and in society, employees in being aware of the context of their work and being *able to seize opportunities*, and is a foundation for more specific skills and knowledge needed by entrepreneurs establishing social or commercial activity.” (COMMISSION OF THE EUROPEAN COMMUNITIES, 2005, emphasis added by the author).

So far the effects of the tools and methods with the new learning environment have been only discussed on practical level. They have not yet been analyzed from the viewpoint of entrepreneurship based on any theoretical framework. Now the definition of entrepreneurship by Commission of the European Communities and the objectives set by Ministry of Education and Culture are used as the framework to discuss the benefits of the learning environment created for IT Bachelor education.

## **2. Background**

This chapter will shortly present the theories on which understanding of a proper current and future learning environment is based. The theories presented here have something in common. They all see an individual as a social being and learning as a social and communal phenomenon. They also see learners as active subjects (rather than passive objects who need to be taught) who will take responsibility for their own learning process when they have an opportunity to do it. These theories consist of Experimental Learning by David Kolb, Social learning theory by Etienne Wenger, Knowledge theory by Ikujiro Nonaka and Hirotaka Takeuchi, theory of learning organization by Peter M. Senge and associates, principles of Organizational learning by Chris Argyris and Donald A. Schön and Action learning theory by Michael J. Marquardt. These theories are presented and discussed below.

### **2.1 Social learning theory**

Etienne Wenger argues that learning is a social participation (Wenger, 1998). It consists of meaning (learning as experience), identity (learning as becoming), practice (learning as doing) and community (learning as belonging). Brown and Duguid define communities of practice (CoP) as social constructs of individuals that connect together people sharing the same interests, objectives – even beliefs and values (Brown and Duguid 1991). They argue that CoPs explain how shared learning is entrenched in complex collaborating environment. The social theory of learning, presented by Wenger combines all the structures presented above. All these social constructs are made in a way that they enable learning in a more efficient way (Wenger 1998).

By creating appropriate circumstances communities of practice may emerge, develop and flourish. By allowing peripheral participation (Lave & Wenger, 1991), learners may slowly move from peripherality to full membership of CoP. The peripherality could be compared to pre-industrial communities where newcomers of a practice where first apprentices and finally became masters of that practice. IT Bachelor students in our degree programme study usually four years before graduate. During this time most of them they will move from peripheral participation to full membership of being IT bachelor student or being a team entrepreneur.

### **2.2 Knowledge theory**

The knowledge has been separated into explicit knowledge and tacit knowledge. Explicit knowledge can be learned from books or other similar sources. Tacit knowledge can be expanded through an individual's experiences. Nonaka defines knowledge creation as a spiraling process between explicit and tacit knowledge. This interaction will create new knowledge. Nonaka goes on by arguing that organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge. Four patterns of interactions, socialization (sharing and creating tacit knowledge through direct experience), combination (combing explicit knowledge with help of information systems), internalization (converting explicit knowledge to tacit knowledge through practice) and externalization (converting tacit knowledge to explicit knowledge through dialogue and reflection) are used to implement organizational knowledge creation. These stages are nowadays well known as the SECI process (Nonaka 1994; Nonaka & Takeuchi 1995; Nonaka & Toyama 2003; Von Krogh et al. 2000).

### **2.3 Experimental learning**

The SECI process presented above has much in common with the model presented by David Kolb a decade earlier. Kolb's work is based on John Dewey's and Kurt Lewin's studies, those who highlighted the role of democratic values like cooperative leadership and dialogue in experimental learning (Kolb 1984, 17). Kolb defines experimental learning as a “central process of human adaptation to the social and physical environment.” (Kolb 1984, 31). The process of experimental learning has four structural dimensions: 1) Active experimentation 2) Divergent knowledge 3) Reflective observation 4) Abstract conceptualization. Each of these dimensions will generate different type of knowledge and they all are necessary to a learner (Kolb 1984, 42).

Kolb defines affectively complex learning environments as "ones in which the emphasis is on experiencing what is actually like to be a professional in the field under study. Learners are engaged in activities that simulate or mirror what they would do as graduates, or they are encouraged to reflect upon an experience to generate these insights and feelings. The information discussed and generated is more often current / immediate. It often comes from expressions of feelings, values and opinions by the learner in discussions with peers or the teacher. Such expressions of feelings are encouraged and seen as productive inputs to the learning process. The learner's activities often vary from any prior schedule as a result of the learner's needs. The teacher serves as a role model for the field of profession, relating to learners on a personal basis and more often as a colleague than an authority. Feedback is personalized with regard to each individual's needs and goals, as opposed to comparative. It can come from both peers and the teacher. There is accepted discussion and critique of how the course is proceeding, and thus, specific events within a single class session are often more emergent than prescribed" (Kolb 1984, p. 198). Other types of learning environments are 2) Perceptually complex learning environment where multiple methods are preferred and process of doing is emphasized rather than outcome. 3) Symbolically complex learning environment where students are trying to solve a problem for which there is a right answer or a best solution. 4) Behaviorally complex learning environments are those in which the emphasis is upon actively applying knowledge or skills to a practical problem.

Kolb's thoughts of an affectively complex learning environment have been in this study applied into practice with IT Bachelor education and expanded from the level of single academic course to whole the curriculum of IT Bachelor students. The learning environment that has been created also utilizes the ideas of a perceptually complex learning environment and a behaviorally complex learning environment. The ideas of symbolically complex learning environment have not been emphasized.

#### **2.4 Studies on learning organization**

The concept of learning organization has been presented to wider audience by Peter M. Senge. In his studies of learning organization (cf. Senge 1990, 2006; Senge et al 1994, 1999, 2000), Senge presents five disciplines with help of which a learning organization could be created. These five disciplines are: 1) Systems thinking 2) Personal Mastery 3) Mental models 4) Building shared vision 5) Team learning.

*Systems thinking* has been defined as an ability to see invisible fabrics, patterns of behavior and connections between interrelated actions. It is the ability to see the conceptual framework of "what is happening?" and it is not easy to recognize the system if one is part of the system that he wants to analyze and understand. *Personal mastery* means that an individual is committed to become better in whatever he is committed to do in his professional life. With support from one's organization an individual commits to his personal lifelong learning. *Mental models* are everyone's hidden assumptions that affect to how we think and act; and one way to diminish their effect is trying to make them visible. To be able to develop as individuals and as a team, everyone should share one's ingrained assumptions, generalizations and other phenomena that affect to our way of understanding the world and our actions as part of it. Building a *shared vision* deals with "picture of the future", where the team or group wants to go. Shared vision cannot be a vision that some individual has, it is rather build up from personal visions melted together in course of time and with shared practice between individuals. *Team learning* is crucial because a team has for a long time been the basic unit of learning.

Team learning deals with patterns of defensiveness in human beings and tries to lift self-defense patterns up to the surface to eliminate them. This will require time and patience. In a longer run mutual trust may develop between team members if they will commit themselves to the process. By practicing dialogue it is in a longer run possible for normal people to achieve extra-ordinary results by really thinking together (Senge 1990; Isaacs 1999).

The learning organization combines people, technology, organization and knowledge with learning. Due to ongoing change caused by globalization only organizations which will succeed in combining these elements will sustain (Marquardt 2002).

#### **2.5 Organizational learning defined**

Organizations are seen as collectivities that in ideal situation learn when their members learn. (Argyris and Schön 1996, 6-7) When learning organization theorists like Peter M. Senge with his associates and Micheal J. Marquardt describe an ideal organization, its characteristics and means how it could be created, theories of organizational learning mostly deal with human defensive reasoning and the ways of overcoming it with planned interventions (Argyris and Schön, 1996, 150-176). Argyris has also been first author to make concepts single-loop and double-loop learning famous for wider public. Single-loop learning means that we learn to make current operations more effectively without questioning the governing variables underlying the operations. Double-loop learning instead concentrates to questioning the underlying beliefs and values and asks if we are doing right things or not.

Furthermore, according to Argyris and Schön argue that there is a difference what individuals say what they are doing (espoused theory) differs from what they actually do in practice (theory-in-action). Without noticing this difference individuals tend to make decisions based on their espoused theories (Argyris and Schön 1996, 13-15). When Senge and other learning organization authors discuss mental models, they mostly refer to Argyris' work on humans' habit of defensive reasoning. Argyris and Schön have also studied the use of dialogue; and their work has been further

developed by William Isaacs (Isaacs, 1999) who's outstanding book on dialogue also combines the theories presented within this article.

Another well-known author on organizational learning is Nancy Dixon. She introduced three types of meaning structures among organizations members. These structures are: private, accessible and collective. The flexibility of boundaries between these meaning structures has an influence to organizations ability to learn (Dixon 1984, 36-43). By moving these boundaries with proper interventions and collective learning methods the share of collective meaning could be expanded.

## 2.6 Action learning

The concept of action learning has been recently emphasized by Micheal J. Marquardt. There have been several variations of the concept but they all share some common elements. The action learning requires real people solving real problems in real time and learning while doing so.

Action learning method consists of six components: 1) Problem 2) Group 3) Questions 4) Action 5) Learning 6) Coach. The problem should be significant and urgent and it should be the responsibility of the team (group) to solve it (Marquardt 2009, 2-3). Asking right questions rather than providing answers is essential in action learning. This will help individuals to separate what they don't already know. Asking questions is also seen as an instrument of a good leader (Marquardt 2009, 74). Asking questions and planning responses to them develops the individuals' ability to reflective inquiry. If learning is not intervened by questions, reflection of what has been learned is easily overshadowed by the urgency of the problem itself (Marquardt 2009, 137 – 140). This suggests that the coach should now and then make an intervention to problem solving for the sake of learning even in situations where everything seems to be running smoothly. Maybe the intervention should be done especially in those situations?

Action learning is seen as a continuous process where the phases follow each other. From this viewpoint the methods overlaps with Kolb's experimental learning cycle, Nonaka's knowledge theory and team learning cycle by Senge et al. Action learning also overlap with some other widely used learning methods, such problem based learning, project learning and learning by development. All of these methods are based on real problems, teamwork, and learning as a social and communal phenomenon. They all also utilize learning by doing as main source of knowledge and combine theories and best practices from several disciplines, such as group dynamics, management science, psychology, and pedagogy.

## 2.7 Pedagogical fundamentals for the school of future

Pedagogical background for the school of future will be based on learning as social and communal process, teaching as facilitating this process and knowledge as a fuel and also as a product of the learning process. The basis for the future school is presented in figure 1.

The fundamentals presented in figure 1 are based on the studies made in elementary school (Smeds et al. 2010) but they are also applicable to university level education. Smeds et al. have summarized several theories that exist behind the development of new kinds of learning environments.

## 2.8 Summary of the background

Why to put effort on presenting the theoretical background related to learning? The answer is that the theoretical background presented here lies behind the most team learning methods commonly used in education. Any theory presented in the previous chapters would deserve much closer look and discussion. Fortunately there are plenty of textbooks available on any of the topics.

Theme	Author(s)	Key assumption(s)
Social learning theory	Lave & Wenger 1991; Wenger, 1998.	Learning is a social and a context related process. Knowledge is always situated. Human beings learn from peers via shared practice and by observing masters.
The knowledge theory	Nonaka, 1994; Nonaka & Takeuchi 1995; Nonaka & Toyama 2003.	Tacit knowledge is created and transferred through shared practice and codified with a dialogue and reflection. Codified knowledge will be again utilized into practice by utilizing information systems. By following this process the total amount of organizational knowledge can be expanded.
Experiential learning	Kolb, 1984.	A learning process includes various stages where different kinds of approaches for learning are required.
Learning organization	Senge, 1990, 1996; Senge et al. 1994, 1996 2000; Marquardt, 2002.	A learning organization is built from various elements, such as team learning and shared vision. The learning organization combines people, technology, organization and knowledge with learning.
Organizational learning	Argyris & Schön 1996; Dixon 1984.	Learning within organizations could be made more productive by increased communication (dialogue) and surfacing hidden mental

		models to diminish human defensive reasoning. Increased communication will also help to diminish ambiguity related to learning of individuals within the organizations. Learning process in organizations should be supported by planned interventions made by researchers or consultants.
Action learning	Marquardt 2009.	Learning takes place through solving real problems in real environment within a team supported by a coach. Asking questions and reflecting of the learnt are essential.
Pedagogical background for the school of future	Smeds et al. 2010.	The schools of future will provide a learning environment where learning, teaching and knowledge will be combined in a way that formal schoolwork and informal learning are both emphasized.

Table 1. A summary of the theoretical background related to guiding ideas behind the development of the learning environment.

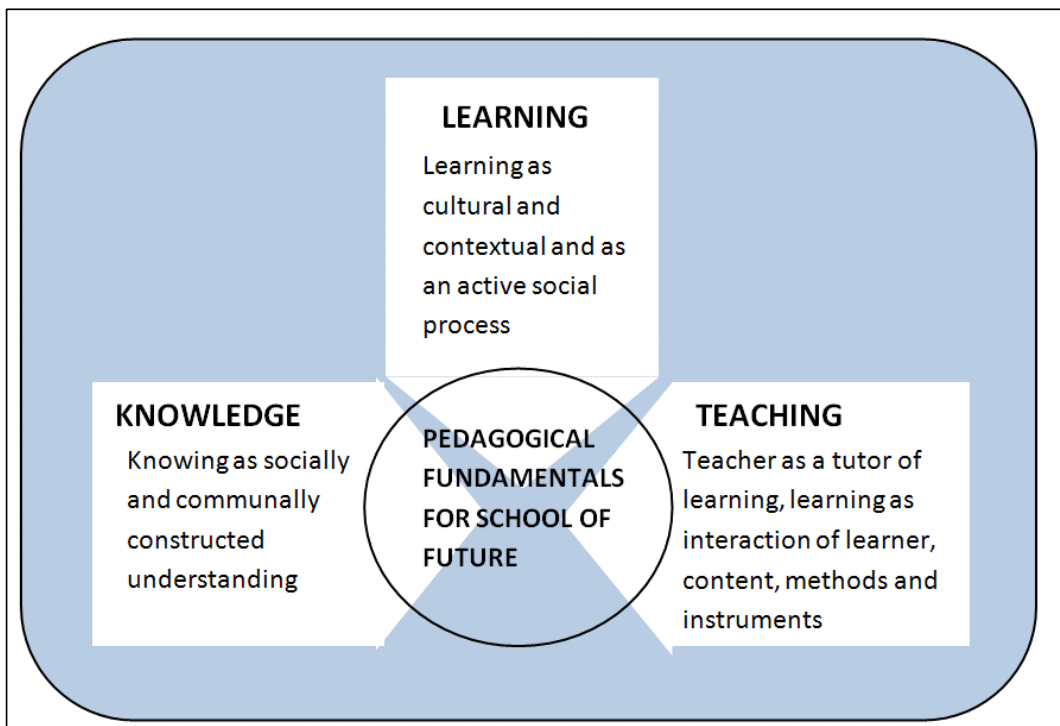


Fig. 1. Pedagogical fundamentals for school of future (modified from Smeds et al. 2010).

There are lots of whole disciplines of research such as organizational psychology, group dynamics, motivation theories and pedagogy which are more or less related to the subject of this study, but they are not presented here. The authors' goal was to clarify the theoretical background behind the learning environment that has been created and also to illustrate the multi-faceted environment where university level IT Bachelor education nowadays operates. A short summary of the theoretical background related to guiding ideas behind development of the learning environment is presented in table 1.

### 3. The research process

This chapter will describe how the research is being conducted. It will also clarify the methods used both in data collection and data analysis.

#### 3.1 Methods of data collection

The students studying IT in our degree programme are divided into four different groups from the viewpoint of this study. These groups are IT team entrepreneurs (teampreneurs), members of the game team, students studying within the international team learning path, and students studying within the project learning path (in more detail, see figure 3).

Data for the article was collected between April 2010 and September 2011 and it consisted of theme-based interviews, observation of team learning sessions "trainings" and analysis of documents in the information repository used by teampreneurs and their coach. The teampreneurs were interviewed first time in April 2010 and second time in February 2011, and total of 25 theme-based interviews were carried out. Interviews lasted from 30 to 120 minutes. To be able to verify how interviewees express their arguments and emotions in team learning sessions, a total of 22 team learning sessions were observed between May 2010 and September 2011. These team learning sessions lasted from 2 to 8 hours. In addition, the author has observed two so-called kickstart events where the teampreneurs were negotiating their leading thoughts, values and mission. Both of these events lasted for two days.

The author had also access to information repository used by teampreneurs and could follow both the written documentation made by teampreneurs and their coach. Both the coaches of the two IT cooperatives and the author are working as lecturers in IT Bachelor degree programme so there have all the time been possibilities to validate in this way the interpretations with the coaches. Some of the questions asked from the teampreneurs during the theme-based interviews were also discussed later in trainings and other team learning situations by teampreneurs themselves. The author has also been able to have access to the students' transcript of records, in order to find out how the studies for IT Bachelor degree are progressing.

The members of the game team were interviewed twice. The first interview was carried out in October 2010 and the second in April 2011. The members of the game team wanted to be interviewed as a team, and therefore both interviews were carried out as group interviews. The interviews were theme-based with some predefined general level themes. Discussions with the coach of the game team has been a secondary source of data.

Students who study within the international group have had development discussions with their tutoring teacher once a year. The author of the article has been the tutoring teacher for the international groups since 2009 and this way the author has been able to interview also these students regularly. We have also organized feedback dialogues twice a term for the international group. These events have also been a fruitful source of data. In addition, the author is involved in planning and organizing education for the international groups. Discussions and email conversations with other colleagues who are involved in organizing courses for the international group, have offered a secondary source of data.

The students who have chosen the project learning study path have been investigated mostly by development discussions. Discussions and weekly dialogues with colleagues have served as a secondary source of data. The author has also had access to students' transcription of records on the basis of which some evaluation of overall progress of studies could be made.

### **Summary of data collection**

Observing the students who have chosen the ICT entrepreneurship study path has been emphasized in data collection. The decision was made because this study path was seen as a remarkably different compared to the other two paths (international team learning and project learning). It was also estimated that with the ICT entrepreneur study path we would face also so far unknown challenges and would be able to learn from solving those challenges. Therefore it was seen as a rich target for closer investigation.

### **3.2 Methods for data analysis**

The interviews were first transcribed to ASCII text and then analyzed utilizing grounded theory (Strauss & Corbin 1990; Corbin & Strauss 2008) and case study (Yin 2003; Flick 2009) methods. The field notes during the observation of trainings and other team learning sessions were written to files and complemented with a research diary with memos of the researcher's comments, questions and drafts of analysis.

Based on Flick qualitative research is of specific relevance to the study of social relations (Flick 2009, 12). For this study qualitative methods were selected because they help to build a richer description of the phenomena studied. For qualitative studies it is typical that multiple methods are used in order to gain more validity for the study.

The grounded theory analysis started with an open coding phase. The open coding phase was based on certain seed categories that in other words meant an interesting phenomenon related to selected research questions. The original seed categories for the analysis were: learning experiences, future challenges, risk taking and team development. Based on the methodological instructions which are related to grounded theory method, the data collection should be continued at least until the data is theoretically saturated (Corbin & Strauss 2008, 263). In other words, when the same phenomena start to repeat themselves in the extra interviews made, there is no reason to continue data collection for that category. After eleven theme-based interviews all the seed categories were well saturated and it became evident that the future challenges and risk taking seed categories were very close to each other.

Open coding was followed by an axial coding phase, which in practice went on almost in parallel with the open coding phase. During axial coding the observations were grouped and relations between them were analyzed. During the open coding and axial coding phases, theoretical sampling (Denzin & Lincoln 2003; Corbin & Strauss 2008) was used (both with interviews and observation) to get better understanding of the interesting phenomena and their relations that were expressed by teampreneurs. Theoretical sampling based on the data with original seed categories guided further data

collection. Two new seed categories, shared goals and working approach, and handling of crisis situations were established based on the theoretical sampling.

The last phase of the analysis was a selective coding. In selective coding the core of the results was formed, and “a story of the case” (Flick 2008) was written. In other words after the selective coding it was possible to say what was going on with the students who are studying IT bachelor degree within the learning environment. A summary of the research methods used in the study is presented in table 2.

Critical incident technology (CIT) is a qualitative analysis method that helps researcher to dig in to critical positive and negative incidents that interviewees have experienced based on their own expressions (Symon & Cassell 1998). With CIT it will be possible to capture the most (i.e. 5 – 10%) critical positive and negative that have happened and possibly separate them for further analysis. By especially concentrating to critical incidents CIT might also provide an interviewee a possibility to reflect personal development and learning experiences as a team member. CIT was used during the theme-based interviews to help the interviewees to recall and reflect on their learning experiences, and it turned out to be a useful method for the ongoing study and it provided a richness of useful insights for further data collection.

The study has been a cyclic process, where data collection, data analysis, planning actions, and implementing the actions into practice, are all repeating themselves. The length of a cycle has so far varied from a few weeks to several months depending on themes under investigation. The study follows the structure typical for action research (Herr & Anderson, 2005; Stringer 2007). Furthermore, there are several parallel processes such as individual learning, team learning and performance measures of the cooperative going on with several groups of students. Therefore several cyclic processes are running in parallel within the study.

Method	A short description	Reference(s)
Action Research	Action research examines the phenomena in their natural settings. Action research as a method has emerged from different traditions and covers several different approaches, i.e. practioners research, action science, participatory rural appraisal, teacher research, participatory action research, and feminist participatory action research.	Herr & Anderson, 2005.
Case study	Case study is an empirical inquiry that investigates a phenomenon within its real-life context. Case study research means single and / or multiple case studies, that can include either quantitative or qualitative evidence, even both. It usually relies on multiple sources of evidence and benefits from the prior development of theories.	Eisenhardt 1989; Eisenhardt & Graebner (2007); Yin 1994, 2003.
Grounded theory	Grounded theory is a research method that has its origins in social sciences. Grounded theory is an inductive research method where the research starts with almost no a priori knowledge about the subject studied. The theory emerges from the data during the data is being analyzed.	Strauss, A. & Corbin, J. 1990; Corbin & Strauss, 2008.

Table 2. Summary of the research methods used in the study (modified from Juvonen & Ovaska, 2010)

#### Summary of data analysis

In general this study is a typical exploratory case study where construct validity is achieved through the use of multiple sources of evidence. The use of multiple sources of evidence is called data triangulation (Flick 2009, 444). The author being the only researcher in the study no official investigator triangulation was used (Flick 2009, 445). However, the author has worked in close cooperation with coaches of the two IT cooperatives, this has offered possibilities for tens of unofficial discussions related to the subjects under investigation. The study will get more internal validity. This will be in a longer run achieved by comparisons of student groups studying within different study paths of the learning environment.

#### 4. Description of the learning environment

The theoretical background of learning as a social phenomenon and knowledge as product of cooperation was discussed in previous chapters. This chapter aims to clarify how these thoughts have been taken into practice by planning and implementing a learning environment with IT Bachelor education in SUAS. Firstly, the objectives for learning environment that would support entrepreneurship set by Finnish Ministry of Education and Culture are presented. After that, the structure behind the realization of the learning environment is presented. Thirdly, some examples of team learning methods used within the learning environment are presented.

##### 4.1 Objectives for the learning environment that would support entrepreneurship

The Ministry of Education and Culture has defined a set of criteria for learning environment which will support entrepreneurship. The criteria are as follows:

- “Student’s own activity is emphasized

- Learning takes place also in simulated or real-life situations
- Students have a possibility to interact with real entrepreneurship
- Learning is based on problem solving and interaction
- Learners are supported by a network of specialists
- The teachers role develops from delivering information to organizing, tutoring, supervising and developing the learning environment” (Ministry of Education, 2009, translated by author)

The first realization based on authors' current knowledge of learning environment that is based on the theories presented above in university level education was carried out by the Tiimiakatemia. The Tiimiakatemia started with marketing education in 1993 and nowadays it's a unit of education that is specialized in entrepreneurship. Its objectives are to develop individual and team abilities in three areas: team entrepreneurship (teampreneurship), team learning, and team leadership (Partus methods).

Our one of the learning environment applies and further develops the solution originally developed in the Tiimiakatemia to IT Bachelor education. Based on the author's current best knowledge (and a literature study made in April 2011) any similar learning environment has not been implemented in practice with IT Bachelor education before our realization.

Learning environments will in future combine teaching, learning and knowledge. Teaching is no longer seen purely as transmission where teacher tries to transfer existing knowledge to students. Teachers will rather act as tutors or coaches who facilitate how learners utilize each other and the instruments of the learning environment. The other role of teachers' is to actively and continuously experiment and develop methods and instruments used in community and team learning.

#### 4.2 The overall structure of our realization of the learning environment

All students in the IT degree programme in SUAS have identical curricula during their first year of study. They will have courses in subjects like basic Information and Communications Technology (ICT) skills, mathematics, physics, languages and methods for learning. During their first spring semester they will decide how they want to continue their studies after the first year. The overall structure of the curriculum and the study paths in our IT degree program are presented in figure 2.

Those who choose the international team learning study path will study in English with international exchange students coming from several countries such as Czech Republic, Russia and China. This group that we call InnoSet, utilizes team-learning methods in international environment and works in teams by doing projects for local companies and other organizations. The tasks they perform usually require complex inquiry to existing knowledge with multiple methods. The projects are steered in cooperation with teachers of SUAS and representatives from cooperation organizations.

The Finnish students who study within this InnoSet group usually choose to study their third year abroad in one of our cooperation Universities. Most of them will also do their practical training (30 ECTS points) during their exchange period. For the fourth year the students will come back to SUAS to finish their studies and to write their Bachelor Thesis.

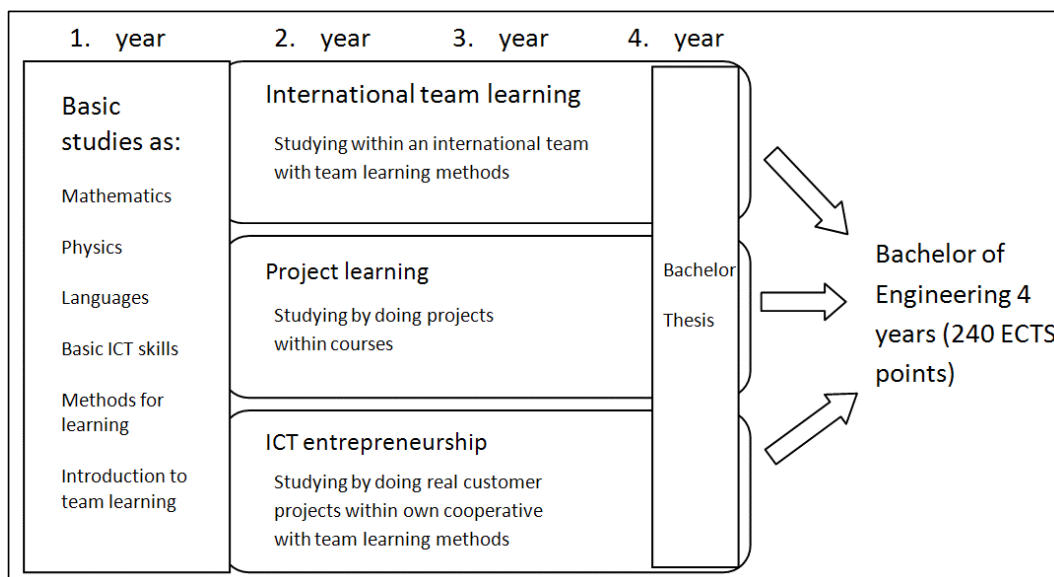




Fig. 2. The overall structure and the study paths of the curriculum in Information Technology degree programme in SUAS.

Students who study 60 ECTS points abroad at our cooperation university will get a Double Degree (DD) when they graduate. In practice they will get a bachelor's diploma both from the SUAS and the cooperation university.

Students who will decide to study by participating to courses and carrying out projects within the courses usually select the project learning study path. The students will have more conventional courses and the projects are included in the courses. In this way, learning by doing is emphasized here too. Students are also encouraged to find projects themselves. The projects are steered in cooperation with the teachers of SUAS and representatives from the cooperation organizations.

In case the students choose to continue their studies as ICT entrepreneurs, they will establish an IT cooperative in the end of their first academic year and start operating the cooperative in the beginning of their second academic year. They will then run the operations of their cooperative for three years until they graduate. We call these students teampreneurs.

There is also a so-called game team, which is a group of four students who study for their Bachelor's degree by designing and deploying games for PC computer and portable devices. The game team could be described as a special case of ICT entrepreneurship. The students of the game team will also establish a company to be able to sell their products. The game team has a coach, who reflects the learning experiences with the team and inspires them with their studies. The overall setting for the study and the authors' role in it is described in figure 3.

#### 4.3 A cooperative as a structure for organizing and as a vehicle of team learning and team development

First IT cooperative in Saimaa University of Applied Sciences, Icaros, was established in 2010 and it is 100 percent owned by nine IT degree programme students of Saimaa University of Applied Sciences (SUAS). The cooperative helps students to organize their actions, mitigate the risk as being an entrepreneur and deal with money gained from the customer projects. Above of these basic practical issues, the cooperative acts as a vehicle for team learning. The team learning methods provide a practice-oriented way to study IT in SUAS. The methods used in team learning are based on research related to learning organization, team building and development, organizational knowledge creation and knowledge sharing. During the autumn 2011 the second IT cooperative, Ideatech, was established and it started operating in September 2011.

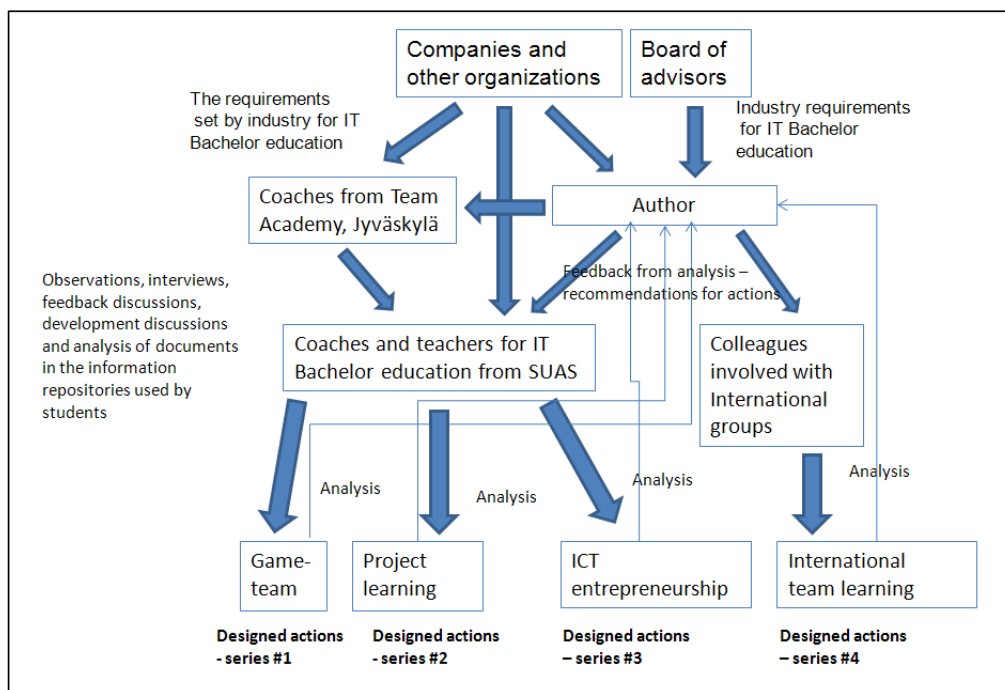


Fig. 3. A description of the overall setting for the study.

#### 4.4 Examples of used methods within our learning environment

There are plenty of tools and methods for individual and team learning and for creating new ideas and developing them to innovations. Within the study paths new methods are also explored now and then by combining the existing ones. Most of these methods are based on the literature that was previously discussed and many of them have a number of versions. The most commonly used team learning methods are shortly presented in Table 3.

Name (that we are using)	A short description	Background / Reference(s)
Team role test	Team role test by Belbin is made for students in the beginning of their first year and again for those who choose to continue their studies ICT entrepreneurs in the end of first year. The results of the test are used later to help students to reflect on themselves as team workers.	Belbin, 2003.
Tryouts / Trainings / Retreats	Students share information about their learning experiences in team learning sessions twice a week. These sessions usually last for 3 – 4 hours. Retreats last 1 – 2 days. During the retreat there are 1 – 2 bigger themes that students will work with.	Isaacs, 1999; Nonaka & Takeuchi 1995; Kolb, 1984.
Learning café / World Café	The objectives are set either by the coach or by students. Students will work in small groups and every group may have its own sub-objective. One student per group will act as a host and will stay in the same group and others will visit to every group for 15 – 30 minutes. The host presents the results gained so far to new students.	Commonly utilized method, origin so far unknown.
Competing parallel groups	Several small groups work with for the same object. The results of a group are compared and discussed together and challenged by other groups.	De Bono, 1970.
Learning agreement	Students practice how to set objectives for themselves and to reflect their individual learning experiences.	Partus methods.
Theory	Every student will read 30 - 90 books during their studies. The books relate to for example ICT, entrepreneurship, and personal development. New insights are discussed on special "book trainings".	Isaacs, 1999; Nonaka & Takeuchi 1995; Kolb, 1984.
Quality check	Yearly event for checking how processes such as individual learning, communal learning and measured of cooperative have developed. There are three levels for each 12 process. Every level of measures has to be passed every time to sustain the achieved levels.	Partus methods. Modified for IT Bachelor education by coaches in SUAS.
Cross fertilization	Students visit to other cooperatives trainings and other events. Learning experiences are later shared to members of the own team.	Concept from Partus methods. The principle has been commonly utilized.
Six Thinking hats	Tools for innovation, usually used in problem solving related to projects to get new insights. Six thinking hats help learners to change their viewpoint when searching for new ideas or solving problematic situations.	De Bono, 1999.

Table 3. Examples of team learning methods utilized with the learning environment.

In addition to the methods listed in table 3 development discussions are carried out with all of the students in the IT degree programme once per year.

### Evaluation of learning

Practices for evaluating students' results and the learning process while achieving the results have been discussed and developed within all our study paths. We emphasize self-evaluation and peer evaluation in parallel with teachers' or coaches' evaluation. Customer projects are also evaluated by customers. This practice is called 360 degree evaluation.

In some of the courses within the project learning path the conventional tests are used as well as instructors' evaluation of practical assignments. Our goal is to continuously learn from the evaluation, therefore the evaluation criteria and justifications for the evaluations are always open for discussion.

## 5. Observations on current and future challenges

### 5.1 Examples of designed actions based on the analysis of the data

After analyzing the data gathered by interviews, observations and analyzing documents in information repositories used by teampreneurs, suggestions were made to the coach of the first IT cooperative. Based on the suggestions for actions

the coach has deployed designed actions with the teampreneurs. Here are some examples of the designed action put into practice:

- During the interviews the students of the game team expressed their interest in increasing cooperation with other student groups. The students of the game team were later invited to a two day retreat and they have been participating in the trainings of the second IT cooperative
- Challenges in leadership and feeling of ongoing "rush" expressed by teampreneurs was discussed and analyzed together with the coach of the first IT cooperative. Based on the analysis of the situation the coach took the topics leadership of the team, and teampreneurs feeling of rush and where it comes from to the next training for discussion
- The bias towards internal development projects and avoiding customer visits was analyzed with the coach of the first IT cooperative. Based on the analysis teampreneurs were challenged to visit a certain amount of potential customers within the next two weeks to get new and versatile projects that would help them to achieve their learning objectives.
- The lack of leadership within the first IT cooperative has been discussed for several times. The issue has been recognized and actions based on it are currently in process.

## **5.2 Challenges related to students and their learning**

Based on gathered data - mostly observation and reading documents from information repository - it seems that some of the students have chosen their study path for reasons that we were not able to predict. It seems that in those cases students have selected "the easiest way" to get a degree. One possible explanation that relates to any student in any university is a suggestion that whenever students are able to decide whether they put extra effort to some issue or not, they will not. Based on the author's experience as being a lecturer this suggestion seems to be valid, at least to some extent. In practice this means that from the student's point of view they avoid any tasks in which they will not be rewarded with ECTS units or money.

Another challenge emerged mostly with IT entrepreneurs is the lack of commitment. Teampreneurs have had quite a vast scope of freedom while agreeing on the rules of conduct and working approach. They have so far preferred to have great freedom but most of the students are not familiar with taking responsibility for their own or with teams work. Based on tens of observations they have violated the basic rules of conduct that they have mutually agreed, such as keeping a deadline for a teams' joint task like visiting potential customers or reading a book.

Based on these findings one possible explanation of teampreneurs' challenges is that unlearning from the working approach of traditional school where teachers will tell students what to do, seems to be difficult and time consuming. An alternative explanation is that students just want to "chill out" (as described above) if no one requires anything more from them. Based on the interviews and observations conducted with the first IT cooperative, there was a severe lack of leadership within the team. Rules that the teampreneurs have mutually agreed on have been repeatedly violated without any consequences and promises have been given but not kept, over and over again.

To summarize, the teampreneurs don't have enough experience and therefore lack of courage to deal with crisis situations; they rather tend to avoid them. In those situations where teampreneurs lack leadership or courage to face difficult or unpleasant situations, the role of the coach is crucial. When difficult issues are continuously avoided by the teampreneurs, it will be the coach' unpleasant task to take the dialogue back to the track and take care that the teampreneurs will not avoid of solving the issues that prevent them from developing as a team. When the teampreneurs will get more experienced and by that means find the courage to solve their challenges independently the coach can step aside again.

## **5.3 Challenges related to personnel and their learning**

A challenge we have to bear in mind all the time is related to the way how students and colleagues within the IT degree programme value themselves as members of the community of practice.

In the course of development of the learning environment the curriculum for IT bachelor degree has gone through remarkable changes. In the beginning of this radical change process it was noticed that among students and also among colleagues there emerged lot of tensions and not all of the tensions were positive. These tensions could partly be described as normal resistance to change. Another very important element of any change process is adequate communication between all parties involved. In the beginning of the change process the importance of communication was probably not fully realized or its role in the change process was underestimated.

When listening to coffee room and other unofficial discussions at the starting phase of the change process, it soon became evident that some students who were not interested in studying as ICT entrepreneurs or were not interested studying within an international team learning path had sometimes felt themselves "leftovers". The same kind of atmosphere was in the beginning recognized also among personnel of the IT degree programme. It took several months, required many discussions and also some arguing before a common view on the way to go on forward with the changes and how to communicate about them was agreed.

Because any change always means destroying something that has existed before, it is essential that the current situation and those involved in constructing it are valued in a polite manner. Through ongoing dialogue with colleagues we have been able to see the change as a possibility to develop something new instead of only rejecting or destroying existing structures for learning.

#### 5.4 Minor success stories during the way

For already two years we have been learning to have dialogue with all the colleagues within the IT degree programme. In the beginning these meetings were more or less discussions and not always even polite at all. Individuals acted with "skilled incompetence" trying to remain in unilateral control of situations and to avoid feeling vulnerable (Argyris and Schön 1996, 90). After two years and tens of continuous weekly dialogues with colleagues the situation started to change little by little. Based on these changes in communication with colleagues it seems that we are already beginning to have some kind of shared vision of what we want to achieve together with the new learning environment for IT Bachelor education.

Another observation that could be described as a minor success story is related to students who study in international team learning path. Those who have 120 ECTS credits may study for Double Degree during their third academic year. This requirement seems to work as a stick and the Double Degree as a carrot for those who want to study abroad.

Students within all three study paths have been satisfied with learning in projects. We have also got lot of positive feedback about the increased flexibility in studies and practice orientation of the content that has been offered for IT Bachelor students. Partly based on the positive feedback from students several colleagues have found more courage to explore and apply new methods of learning in IT Bachelor education.

Most colleagues within the IT degree programme have been involved in the development project called TULKKI where a cooperation model between Saimaa University of Applied Sciences and other organizations in South Eastern Finland has been developed. The cooperation model complements the learning environment that has been developed by clarifying each parties' (student, teacher, company representative) role in acquiring new projects and steering them. The development project has also provided possibilities to explore and implement new team learning methods into practice simultaneously with the development of the learning environment.

## 6. Discussion

It has been interesting to observe how individuals act in a learning environment where they have much freedom to choose how they learn and in some extent also what to learn. So far most of the data supports the finding that students feel more motivated when they have more possibilities and freedom to choose. However, they have not so far much grasped these possibilities but rather enjoyed the freedom to study in their own rhythm. This interpretation was supported when reviewing the students' transcription of records. Students tend to study issues that they prefer and postpone the issues they feel challenging or even boring. From this point of view students are similar regardless of the study path they have chosen.

The issue that was widely expressed during interviews and later also validated through observations was that teampreneurs tend to discuss and plan but they will not act. The hardest part is always the path from idea to innovation, in other words how to put ideas and decisions into practice. Learning by doing requires practice on the individual level and shared practice in team level. Without these crucial elements there will be no basis for team learning. When there are not enough versatile projects available, there will not be enough versatile learning guaranteeing that studies will progress in an appropriate way.

An objective	Solutions in our learning environment
Student's own activity is emphasized.	The methods are used within the learning environment make a student an active subject rather than passive object.
Learning is carried out also in simulated or real-life situations.	In every study path project learning is utilized in real customer projects with cooperation organizations. Currently there are over thirty parallel projects where our IT students are learning with the support of teachers and representatives of the customer organizations.
Students have a possibility to interact with real entrepreneurship.	Within the ICT entrepreneurship study path students study as teampreneurs for three years.
Learning is based on problem solving and interaction.	Team learning is emphasized within all three study paths. Problem based learning is commonly used in courses and customer projects.
Learners are supported by network of specialists.	Information sharing between all colleagues in the IT degree programme about progress of learning objectives of students is ongoing. Dialogues 2-4 hours per week with colleagues will guarantee that the learners are

The teachers' role develops from delivering information to organizer, tutor, supervisor and developer of the learning environment.	supported with their learning objectives. Teachers act on several roles, such as lecturers, project steering group members, supervisors, specialists, facilitators, and coaches. Teachers are also responsible for development of the learning environment and exploring and applying new methods and instruments for learning.
--	--

Table 4. Summary of objectives for learning environment and our solutions for achieving them.

Students who have decided to study in English within the international team learning study path have committed themselves to study at least 120 ECTS credits during their first two academic years. The limit was originally set to guarantee that the students who will go abroad for a year will not drop out during their studies. Based on experiences so far, the limit has been "an accidental carrot" and it has had a strong positive effect to the students' motivation for studies overall. Based on the observations with three international groups it seems that students will learn a language and do a project work on a practical level. It requires a few weeks to "defrost" after which students will work with projects in international teams more fluently.

A short summary of the objectives set for a learning environment that will support entrepreneurship set by the Ministry of Education and Culture and examples of how they have been solved in our learning environment are presented in table 4.

## 7. Summary

The trajectory for building the learning environment for the IT Bachelor education at Saimaa University of Applied Sciences described in this article started three years ago. Some changes in personnel and increased dialogue and cooperation between colleagues laid the cornerstones for the radical change process in developing the learning environment for IT Bachelor education in Saimaa University of Applied Sciences.

These changes had not happened without individuals who had enough courage to work with uncertainty and unknown. By slowly increased mutual trust between colleagues involved in the development of the learning environment there have been enough strength and stamina to overcome resistance and even moments of despair. Realization of transformational change in education is not an easy task but based on the analysis so far it can be achieved. At the same time the objectives for a learning environment that supports entrepreneurship in the way set by the Ministry of Education and Culture have been achieved.

When the study started in February 2010, there was one IT cooperative and a small group of international students. Now, in October 2011, there are already two IT cooperatives, the third international group (19 students) and the amount of Double Degree students is steadily increasing. The Double Degree cooperation has awoken an interest for other partner Universities in Europe as a result of which two new double degree agreements are currently in process. There is also been some more students who are interested in studying by developing games, a fact that could lead to establishment of another game team. Based on the facts above and the interest that the learning environment has created on national level it seems that the learning environment we have created might somehow meet the challenges that we nowadays face in the IT Bachelor education in Finland.

Unfortunately it seems that our degree program will run out of time. On 5th of October 2011 we got the breaking news from the Ministry of Education and Culture, a suggestion of discontinuation of our degree programme. If this will happen, the results achieved with the learning environment described in this article will come too late. In spite of this, it has been a very interesting and challenging time to participate in the creation of the learning environment. Who knows if the learning environment described in the article could be implemented somewhere else with people with the same kinds of courage and leading thoughts that we have in the IT degree program of Saimaa University of Applied Sciences.

## 8. Acknowledgements

Studying the IT students utilizing team learning methods and describing the learning environment that has been built in cooperation with colleagues has been an interesting and challenging task. It has given the author a possibility to investigate theoretical background of several disciplines and to interview and observe students who have been studying within the learning environment. The author wants to thank all the colleagues in the IT degree programme for the cooperation and especially all the students who have been studying within the learning environment that we have created together. When you have done your best, there is no need for further explanations.

## 9. References

- Argyris, C. and Schön, D. (1996) *Organizational learning II: Theory, method and practice*, Reading, Mass: Addison Wesley.
- Belbin, R. Meredith (2003). *Team Roles at Work*. Elsevier.
- Brown, J. & Duguid, P. (1991). *Organizational Learning and Communities of Practice; Toward a Unified view of Working, Learning and Innovation*. *Organization Science*, Vol. 2, No. 1, February 1991.

Commission of the European Communities. Brussels, 10.11.2005. COM (2005) 548 final. 2005/0221(COD). Proposal for a Recommendation of the European Parliament and of the Council on key competences for lifelong learning.

Corbin, J. & Strauss A. (2008) *Basics of Qualitative Research 3e. Techniques and Procedures for Developing Grounded Theory*. Sage Publications.

De Bono, E. (1970). *Lateral thinking*. Penguin books.

De Bono, E. (1999). *Six Thinking Hats*, New York: Back Bay Books

Denzin, N.K. & Lincoln, Y.S. (editors). *Collecting and Interpreting Qualitative Materials*. Sage Publications 2003.

Dixon, N. (1994). *The Organizational Learning Cycle, how we can learn collectively*. London: McGraw-Hill.

Easterby-Smith, M., Burgoyne, J. & Araujo, L. (eds) *Organizational Learning and the Learning Organization*. Sage Publications 1999.

Eisenhardt, K.M. Building theories from Case Study Research, *Academy of Management Review*, 1989 14(4), p. 532-550.

Eisenhardt K. & Graebner M.(2007). Building theories from case study research. *Academy of Management*, 50 (1), 25-32.

Ministry of Education (2008). *Koulutus ja tutkimus 2007 – 2112 kehittämissuunnitelma*. Opetusministeriö.

Flick, U. (2009). *An Introduction to Qualitative Research*, Edition 4. Sage Publications.

Isaacs, W. (1999). *Dialogue: The art of thinking together*. Doubleday, Randomhouse Inc.

Herr, K. & Anderson, G. (2005) *The Action Research Dissertation: A guide for students and faculty*. Sage Publications 2005.

Juvonen, P & Ovaska, P. (2010). Studying IT Team Entrepreneurship as a Potential Learning Organization. Published in Knowledge Management and Information Sharing (KMIS2010) conference in Valencia 25. – 28.10.2010.

Kolb, David (1984) *Experimental Learning*. Prentice-Hall, Englewood Cliffs, NJ.

Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press 1991.

Lipman-Blumen, Jean & Leavitt, Harold (1999). *Hot Groups. Seeding them, Feeding Them, and Using Them to Ignite Your Organization*. Oxford University Press.

Marquardt, Micheal J. (2002). *Building the Learning organization. Mastering the 5 elements of Corporate Learning*. Nicholas Breadley Publishing.

Marquardt, Micheal J. (2009). *Optimizing the power of Action Learning. Solving problems and Building Leaders in Real Time*. Davies-Black.

Ministry of Education (2004). *Policy for entrepreneurship education*. Opetusministeriön julkaisuja 2004:18.

Ministry of Education (2008). *Koulutus ja tutkimus 2007 – 2112 kehittämissuunnitelma*. Opetusministeriön julkaisuja 2008:9.

Ministry of education (2009). *Yrittäjyyskasvatuksen suuntaviivat*. Opetusministeriön julkaisuja 2009:7.

Nonaka, Ikujiro (1994). A dynamic theory of Organizational Knowledge Creation. *Organization Science*, Vol. 5 No. 1, pp. 14 – 37.

Nonaka, Ikujiro & Takeuchi, Hirotaka (1995) *The Knowledge Creating Company. How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press.

Nonaka, I. & Toyama, R. (2003) *The knowledge-creation theory revisited: knowledge creation as a synthesizing process*. *Knowledge Management Research & Practice*, Vol. 1 Issue 1, pp. 2-10.

Partus methods, available in <http://partus.fi/partusoy/partus-english>, referred 30.5.2011

Senge, P. (1990). *The Fifth Discipline – The Art & Practice of the Learning Organization*, Sage, New York.

Senge, Peter, M. (2006). *The Fifth Discipline Revised and Updated*, Random house 2006.

Senge, P., Ross, R., Smith B., Roberts, C. & Kleiner, A. (1994). *The Fifth Discipline Fieldbook*. Nicholas Brealey publishing. *Strategies and Tool for Building a Learning Organization*.

Senge, P., Kleiner, A., Roberts, C., Roth, G. & Smith, B. (1999) *The Dance of Change. A Fifth Discipline Fieldbook for Mastering the Challenge of Learning Organizations*.

Senge, P., Cambron-McCabe, N., Lucas, T. Smith, B., Dutton, J. & Kleiner, A. (2000). *A Fifth discipline resource. Schools that learn*.

Smeds, Riitta, Krokfors, Leena, Ruokamo, Heli & Staffans, Aija (2010). *Aalto-yliopiston teknillinen korkeakoulu informaatio- ja luonnontieteiden tiedekunta, Tuotantotalouden laitos, Yritystoiminnan simulointilaboratorio SimLab*.

Strauss, A. & Corbin, J. *Basics of Qualitative Research, Techniques and Procedures for Developing Grounded Theory*, second edition. Sage Publications 1990.

Stringer, E.T. (2007) *Action Research third edition*. Sage publications.

Symon, G. & Cassell, C. (Eds.) (1998) *Qualitative methods and analysis in organizational research. A practical guide*. Sage Publications.

Von Krogh, Georg, Ichijo, Kazuo & Nonaka, Ikujiro (2000). *Enabling Knowledge Creation. How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford University Press.

Wenger, Etienne (1998) *Communities of Practice. Learning, meaning and Identity*. Cambridge University Press 1998.

Yin, R.K. *Case Study Research Design and methods*, Sage Publications 1994.

Yin, R. K. (2003) *Applications of Case Study Research*. Thousand Oaks: Sage Publications.

### **Publication III**

Originally printed in International Journal of Globalization and Small Business (IJGSB), Vol. 3, No. 1, pp. 73–89, with permission of Interscience.





## The challenges for small software firms in industry globalization

Kari Smolander\*

Lappeenranta University of Technology  
P.O. Box 20  
53851 Lappeenranta, Finland  
E-mail: kari.smolander@lut.fi  
\*Corresponding author

Päivi Ovaska and Pasi Juvonen

South Carelia Polytechnic  
Koulukatu 5 B  
55120 Imatra, Finland  
E-mail: paivi.ovaska@scp.fi  
E-mail: pasi.juvonen@scp.fi

**Abstract:** The prospects of locally operating small software firms have lately been dimmed by the processes of globalization, Information Technology (IT) outsourcing and offshore software development. In this study, the current situation of the small local software firms serving the globally operating forest industry in south-east Finland is analyzed. The analysis identified three types of local software firms. Using business processes, technologies and the types of customer relationships as the bases, these can be labelled as anticipator, specializer and collector. The small software firms had recognized their inability to compete with globally operating software enterprises and they had difficulties in coping with the changes in competition caused by outsourcing, mergers and offshore development. The analysis of the future trends produced three possible models of cooperation between asymmetrical partners, tailored solutions providers, software producers and capacity providers.

**Keywords:** software business; software organisations; asymmetry; grounded theory; globalization; forest industry.

**Biographical notes:** Kari Smolander is a Professor of Software Engineering in the Department of Information Technology, the Lappeenranta University of Technology, Finland. He has a PhD (2003) in Computer Science from the Lappeenranta University of Technology and a Licentiate (1993) and Master (1988) degree from the University of Jyväskylä, Finland. In addition to his long teaching experience, he has worked for several years in the industry and in the 1990s, he was the main architect in the development of the MetaEdit CASE tool. He has published more than 50 refereed research papers in international journals and conferences. His current research interests include the architectural aspects of systems development and the organisational view of software development.

Dr. Päivi Ovaska is a Researcher and Lecturer specialising in the fields of Information Systems Development, Implementation and Adoption in Organisations. She has degrees (MSc, LicTech and DrTech) from the Lappeenranta University of Technology, Finland. She has gained a long experience from the software industry while working as a Software Designer, Project Manager and Head of the Department of several software firms in Finland for over 15 years. Now, she is working in the South Karelia University of Applied Sciences as a Senior Lecturer. She has been acting as an Associate Editor and in the programming committees of several conferences, such as the *European Conference in Information Systems* and *Information Systems Development*. She is also actively writing her research in top IS journals.

Pasi Juvonen is a Researcher and Lecturer specialising in the fields of Organisational Learning, Information Systems Outsourcing and Information Systems Development and Adoption in Organisations. He has an MSc degree (Eng.) from the Lappeenranta University of Technology, Finland. He has been working for several years as a Lecturer in the South Karelia University of Applied Sciences. He has been actively writing about his research topics and has also been participating in the programme committee of the Information Systems Development conference.

## 1 Introduction

The business environment of software firms has changed. The recent development of the outsourcing of Information Technology (IT) work (Dibbern *et al.*, 2004) has further expanded under the term 'offshore software development', which basically means the outsourcing of software development work to lower-cost countries. The main motivation behind offshore development is to reduce the software development costs (Gopal *et al.*, 2002). With lower per capita labour costs, large-scale software producers and their large industrial customers may benefit from moving parts of the software development work offshore. Countries such as India and Russia have established a significant presence in this market. Small software firms in high labour-cost countries face a new situation in this kind of competition.

Our study investigates and characterises the situation and seeks ways to increase the awareness of the small local software development firms who wish to continue their operations with their large industrial customers. In a theoretical sense, the relationship between the local firms and their large customers can be characterised as asymmetrical (Doz, 1988; Blomqvist, 2002), *i.e.*, their resources and sizes are not equal. In this kind of a situation, a large customer could easily replace its local software supplier in one way or another. With Porter's (1985) terminology, the bargaining power of the customers exceeds the bargaining power of the suppliers, new (and possibly bigger) entrants can easily enter the marketplace and the intensity of competitive rivalry may rise. We assume that this kind of situation has effects on the cooperation and software development process between the two parties. With the forces of globalization, this asymmetrical situation requires the small firms to refocus their strategy. The small firms must rethink their differentiation, resources and costs (Grant, 2002). With this paper, we wish to explore this issue and shed light on those concrete forces and problems that small software firms face in their daily survival struggle with a globalizing industry.

The objective of this study is to find out how an asymmetrical, globalizing environment affects the positions and practices of the local software firms. We observed the relationship between the globally operating forest industry and the small software firms in south-east Finland. Our purpose is to analyze the problems and best practices of the small software firms, estimate their future possibilities and challenges and, finally, to suggest actions and further development for these firms.

The data for this study was collected using theme-based interviews. We interviewed the representatives of the software firms and forest industry corporations in the area. The research process followed the qualitative grounded theory method (Strauss and Corbin, 1990). The research was implemented in a purely inductive fashion. In practice, this meant that there were no *a priori* theoretical frameworks from the beginning and the results were fully grounded to the collected data.

In the following sections, we will first make some remarks on the current literature and its treatment of small software firms. After that, the research process and the achieved results will be described. Finally, we state some future possibilities for the local software firms from the viewpoint of the global industry and discuss the effects of the results on the possible paths of development of the small and local software firms.

## 2 Small software firms and their classification in literature

A typical Finnish software company is rather small in size. Based on a recent national software survey, 53% of the Finnish software companies have one to ten employees (Jokinen *et al.*, 2004). According to the same survey, 80% of the Finnish software companies have less than 50 employees. Small organisations prevail in software development globally, as well. The US Census Bureau reports that in the USA, 91% of the establishments in 'Computer Systems Design and Related Services' have less than 20 employees (US Census Bureau, 2005).

Despite the fact that most software organisations are small, customer organisations are becoming bigger. Globalization and the consolidation of industries are changing the business of software firms. The relationships between the small software firms and their large customers have not attracted the attention of researchers much. The common problems and best practices in the small software firms may differ from those of the bigger software enterprises that are the targets of most academic studies (Fayad *et al.*, 2000; Hofer, 2002). The studies focusing on the asymmetric relationship between a small software supplier and its customers are very rare. Blomqvist (2002) has made a framework of asymmetric technology partnership formation. The study does not concentrate specifically on software firms, but on ICT companies, overall.

Several studies concerning software companies, their typologies and their business models have been made during the past few years. Hoch *et al.* (1999) have made a qualitative worldwide survey of software enterprises. According to them, the three main types of software businesses are mass-market packaged software, enterprise solutions and professional services. Another coarse classification was done by Cusumano (2004), who divided the software

companies into product companies and service companies. Between these two categories, Cusumano placed his third category, hybrid solutions, which consists of software companies coping with both product and services businesses. Carmel and Sawyer (1998) have divided the areas of the software business as packaged software, custom information systems development and embedded software. Brouthers and Van't Kruijs (1997) have made an extensive case study that classifies some European software companies using several dimensions and identifies strategies for them.

Several typologies concerning one country or one region have been made and they mostly consist of similar kinds of categories mentioned above (Arora *et al.*, 1999; Groves *et al.*, 2000; Tähtinen, 2000; Sallinen, 2002; Nathan Associates Inc., 2003; de Fontenay and Carmel, 2004; Isaksen, 2004; Boltramovich *et al.*, 2005). The viewpoint and focus of these studies differ from each other, but the software business is seen quite similarly, regardless of the nation or region. Rajala *et al.* (2001) have built a framework for analysing business models in the software industry and extracted from the framework a set of the possible types of software businesses. In addition, there is a multitude of studies that concentrate on one aspect of small software firms, internationalisation and the related market entry and operation models (Bell, 1995; Bell, 1997; Coviello and Munro, 1997; Moen *et al.*, 2004; Ojala and Tyrväinen, 2007).

The abovementioned classifications and typologies enable us to see the field of software development as a whole. However, they do not give us much when approaching small organisations, their problems and daily survival strategies and the asymmetry between a small software firm and its large customer. In addition, many of these studies mostly focus on bigger software enterprises. Therefore, it is our view that the situation and characteristics of the small local software firms require a thorough analysis in the globalizing business environment.

### **3 The research target and process**

The forest industry is one example of a globally operating industry. South-east Finland has one of the world's densest concentrations of forest industry, consisting of pulp, paper and paperboard mills, wood saws, surfacing and impregnation mills and plywood factories. During its history, this concentration has also created a cluster of local service organisations, including IT service providers, automation experts and specialized software and systems organisations. These local service organisations of various sizes must cooperate with the forest industry, which is consolidating and becoming more and more multinational and global.

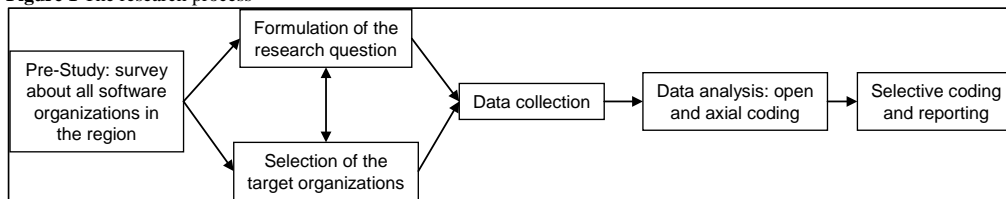
The worldwide paper consumption can be characterized by a relatively strong growth and its emphasis is in Southeast Asia and Latin America. A natural consequence is that forest industry corporations must globalize. The development also has its effects on the software and information systems needs of the forest industry and also on the success of the local software firms in south-east Finland, having forest corporations as their customers.

Although the concentration of the forest industry in the area has created a group of IT and software firms serving the industry, the situation among these IT and software firms is far from perfect. Especially, the competitive circumstances of the software firms can be characterized as unique. Most of the local software suppliers for the forest industry are small, having less than ten employees. There is only one large globally operating software company in the region. The others are small by any standard and have hard times when trying to compete with the large globally operating software companies and with other global software enterprises operating from elsewhere.

The project (Figure 1) started in May 2004 with a general survey about all the software organisations in south-east Finland (Nikula *et al.*, 2005). Our project partners visited all the software organisations in the area and evaluated their practices with a survey (Nikula *et al.*, 2005). In total, 99 software organisations were identified and 81 visits were made, because not all organisations were willing to participate in the study or there were other practical obstacles that prevented us from visiting them. The results of the pre-study included, for example, the list of businesses that are customers of the software organisations in the area and the most important perceived problems of their software development. In addition, the phase produced all the important statistics and key figures of the organisations and information about the technologies and products used in each of the organisations.

Using this information, we were able to put our concentration on the issues that seemed to cause the most concern in the organisations. According to the results of the pre-study (Nikula *et al.*, 2005), the most important issues needing further development were related to the beginnings of software development projects and customer cooperation. Examples of such areas include project planning and software requirements specification.

**Figure 1** The research process



Another important piece of information from the first phase was the identification of the customer clusters of the software firms in the region. There were two major clusters that are important for the local software firms, namely, the forest industry sector (20% of the customerships) and the IT industry sector (19% of the customerships). Because we were not able to study in depth all the 99 software or IT companies in the area, we decided to concentrate on the firms that are producing software for the forest industry sector. In addition, we also decided to take the major forest industry corporations and their software acquisition processes into our focus. Our aim was to compare and analyze the views of both the software firms and their customers in the forest industry.

The research question was formed from the fact that according to the pre-study, the most perceived problems and tasks needing more support were situated in the project beginnings, in phases like project planning and software requirements specification. Therefore, we decided to start data collection under the working title of “Software project beginnings in small and middle-sized software firms delivering software for the global forest industry.” We understood that one of the most important concepts will be the asymmetry between the organisations (Doz, 1988; Blomqvist, 2002) – in this case, the software firms were very small and local when compared to their global customers.

The data for the qualitative study reported in this paper was collected using theme-based interviews. From the population of the pre-study, we selected ten small and local software firms, one globally operating software corporation and four large forest industry locations for further study. Because we visited some organisations twice, we made in total 19 theme-based interviews in our study. All the 19 interviews lasting from 30 min to 2 h were recorded and fully transcribed as text. The data was collected from October 2004 and November 2004.

The collected data was analyzed according to the grounded theory method (Glaser and Strauss, 1967; Martin and Turner, 1986; Strauss and Corbin, 1990; Locke, 2001). Qualitative research requires the ability to interpret people’s actions and verbally expressed thoughts. In addition, these interpretations must be confirmed from the research data and from the experiences of other researchers and practitioners (cf. Klein and Myers, 1999). Because our research included three researchers in close cooperation, we were constantly able to confirm our interpretations with each other. The analysis started with open coding, where three researchers analyzed all the transcripts. In the beginning, each researcher had a different viewpoint on the data. In the first viewpoint, we concentrated on observing the problems and best practices in the cooperation between the local software firms and global industry customers. The second viewpoint focused on the business partnerships between the small and large firms and their expectations of the future. In the third viewpoint, we studied how the software projects are initialized in the observed software firms. This way, we were able to implement investigator triangulation (Denzin, 1978) in our study and confirm our findings in weekly meetings between the researchers.

The grounded theory method includes three phases of analysis (Strauss and Corbin, 1990):

1. open coding, where the research data are categorized
2. axial coding, where the connections between the categories are identified and the categories are further developed
3. selective coding, where the core category is selected and described theoretically

The open coding of each of the viewpoints started from the ‘seed categories’ provided by the viewpoint. For example, in the second viewpoint, ‘how can the business partnerships between the local software firms and their global customers be characterized and what are the expectations for the future?’ we started open coding by searching for mentions in the interviews about the current relationships, weaknesses and strengths of the partnerships, as well as the future expectations between the local software firms and their forest industry customers. The conceptual categories of ‘current relationship’ and ‘future expectation’ can thus be regarded as the high-level seed categories of the data analysis. This ‘open coding’ phase (Strauss and Corbin, 1990) proceeded iteratively parallel to the ‘axial coding’ phase, in which the relationships such as causality or any kind of association between the identified categories were built.

The analysis ended with 'selective coding', in which the core of the research results was formed. In this phase, the three viewpoints were consolidated and a coherent story about the phenomenon was written. The first viewpoint concentrated on the problems and good practices in the cooperation and described the current situation between the local software firms and the global industry customers in the area. The second viewpoint that focused on the business relationships between the small and large organisations clearly expressed the future possibilities for the local software firms from the global industry point of view. Unfortunately, the third viewpoint, the software project beginnings in the forest industry, did not add much to the picture. The observed issues in the project beginnings were much the same as those commonly reported in software development projects.

#### **4 The observations on small software firms**

Based on the gathered data from the interviews, we were able to recognize the best practices and common problems of the studied small software firms. We were also able to characterize these small firms and extract three different types of small software firms and their typical features.

##### *4.1 The general observations on the relationships between the small and large firms*

Most of the small software firms expressed themselves as flexible, innovative and cost-effective. They considered themselves more productive than how they felt the bigger software enterprises are.

Flexibility, cost-effectiveness and innovativeness were also the features that the forest industry enterprises considered the most important factors in the relationship between them and the small software firms. Some comments concerning flexibility and cost-effectiveness are included here:

"It is probably some level of flexibility. We are able to adapt to customer needs. Bigger enterprises are not so flexible because they tend to make software products that are not so easy to tailor according to customer needs ... another reason has probably been our cost-effectiveness."

"Q: So ...you see that your strength has been the ability to react quickly? A: Sure. That is definitely one reason. We are able to react fast to what a customer wants and wishes, at least we try our best and we are able to do it quickly."

One option for the small firms to compete with the larger ones is to network with each other. Based on the interviews, some small firms had already cooperated with each other to some extent. The cooperation had so far been mostly related to the adoption of some technology. Some small software firms had also acted as subcontractors for the bigger software enterprises. The extent and quality of the cooperation differed considerably. Some firms had constant relationships with others and some cooperated only on an *ad hoc* basis. Still, most of them were interested in networking with each other. However, they considered themselves too small to act as a leader in a network and expressed the need for a bigger organisation to lead the network. Despite the fact that some were suspicious towards the benefits of networking, most of the small firms felt that networking will be inevitable and the only way to survive in the competition is to work with the bigger software enterprises.

The small software firms considered the market situation in the area challenging. They felt that the big international software enterprises are expanding their market share and this will make the business opportunities of the small firms more difficult. They considered that the requirements of the forest industry customers are becoming more and more demanding. According to some interviewees, a forest industry customer tries to avoid risks and, therefore, they felt that it is difficult for the small firms to show enough credibility and liability. Some comments concerning liability and continuity are included here:

"Q: What does the forest industry think about small software companies; your company is quite small?"

A: Yes, we are a small organization. We have heard from industry representatives that we are a business risk for them. They think that it is risky to operate with a small company, because they will never know when the business ends."

"...continuity is an important issue. A company has to be alive still after 5 or 10 years. Another important issue is support, like helpdesk, which is definitely one problem for small software organizations."

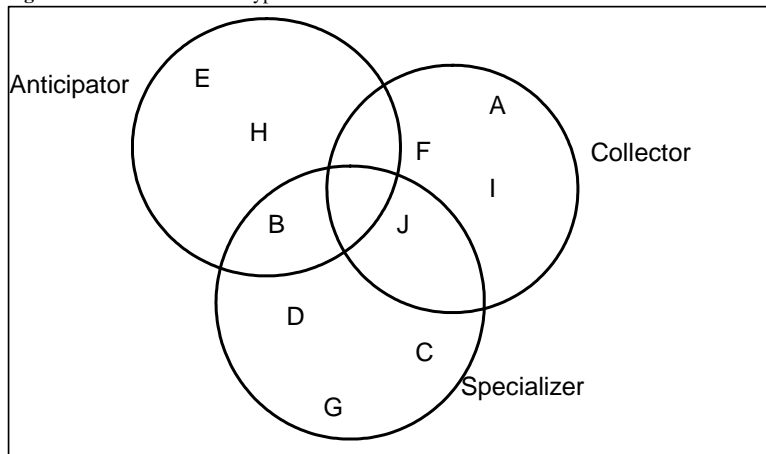
Some felt that coping with a global forest industry enterprise is difficult because the big customer dominates the relationship. These small software firms considered that flexibility means to the customer a possibility to reschedule projects or change the deadlines at their own will. In this kind of a relationship, a small software firm has to follow

these changed schedules and deadlines to keep the customer satisfied. According to some small firms, a forest industry customer also requires the local software firm to be more cost-effective than the bigger software enterprises.

#### 4.2 The three types of small software firms

We identified three types of small software firms. This classification was based on the business processes, the number of technologies and the types of customer relationships and cooperation with other organisations. We named these types as *anticipator*, *specializer* and *collector* (see Figure 2).

**Figure 2** The three identified types of software firms



An anticipator acts proactively and tries to recognize the weak signals and emerging new technologies. It seeks new information systems and product solutions for its customers and tries to implement these solutions to add value to a customer's business. This type of firm is interested in making long-term plans concerning the development of solutions with its customers. A comment describing the work of an anticipator is cited below:

"...the sooner we have a mutual view with the customer, the sooner we are able to test our solutions and bring a mature technology for our customer. Nobody wants to pilot themselves, it is always better to have a partner in the evaluation."

An anticipator usually has long-term customer relationships. The cooperation is typically guaranteed with agreements. An anticipator tries to deepen its customer relationships by evaluating and making pilot projects together with its customer. It considers customer relationships as its most valuable asset and, therefore, it takes good care of its customer relationships.

A specializer has a strong competence in one or two technologies. It develops its technology competences proactively. A specializer does not have cooperation in its main technology areas. However, other software firms and customers would be eager to cooperate with a specializer because of its strong technological competence. Therefore, this type of firm does not need much marketing or sales promotion. A comment describing a specializer's actions is shown below:

"...we had earlier contacts with our present customer so they already knew what we had earlier done and what we are able to do. This made our work much easier because that work was already partly done."

A specializer may also have one or more products of its own. Usually, specializers carry out tailored projects and, at the same time, they develop their products. A strong technological competence makes the specializer different from the other two types.

A typical characteristic of a collector is its fragmented business. A collector can be compared to a general store that sells and makes anything a customer is willing to pay for. A collector may develop a software product of its own and it can also act as a hardware reseller. A collector has many customers and different types of customer relationships that typically do not last for a long time.

A collector actively builds networks of different specialists that act as subcontractors in projects. A collector may also act as a broker trying to bring suppliers and customers together.

Some collectors see the processes of requirements specification and project management very important and they have also developed these processes. Other collectors consider process improvement as a waste of time and had not invested in it at all. The following example shows how a representative of a small software firm considers this issue:

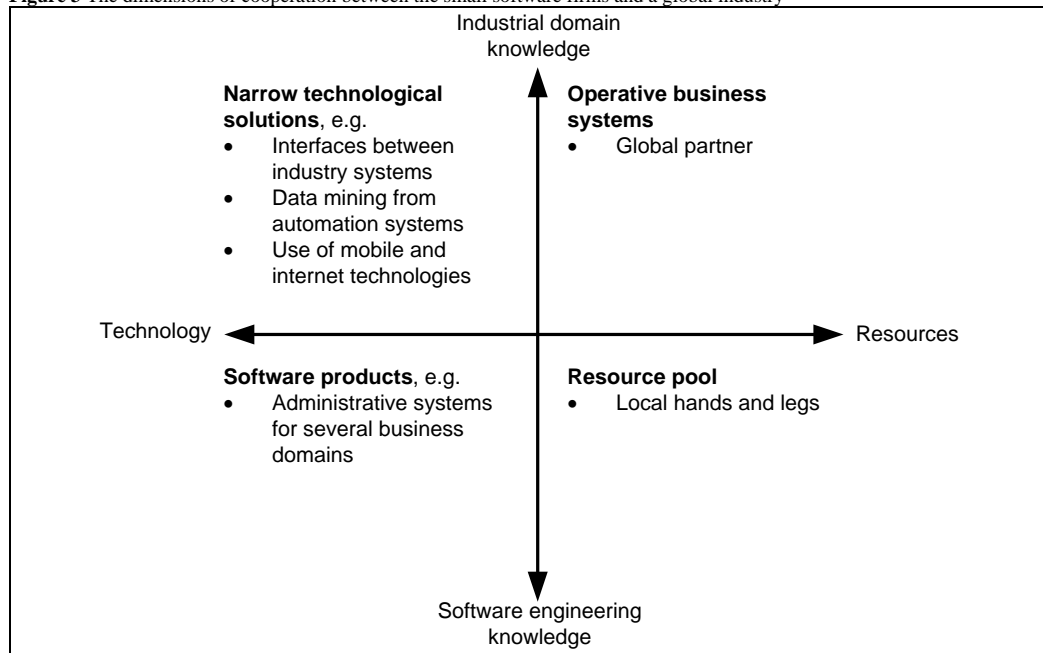
“...Our company is so small that we do not have time or resources to make lots of specifications. It is in my responsibility to think how our business can be profitable and how we can earn money. It is a shame that we are not able to close the doors for a while and do these things better. Surely, this would be better after...”

## 5 The global industry view on small firms

The interviewees from the global forest industry expressed several possibilities for the cooperation between the small local software firms and the global industry enterprises. It became evident that small software firms did not have much of a possibility to operate with the global forest industry in the area of ‘operative business systems’ (Figure 3), because these solutions require a very long maintenance time frame (10–20 years) and an extensive and large and preferably globally operating support organisation. The forest industry wants to avoid risks and therefore, it selects large organisations as their partners in this area. There is also a tendency in the industry to reduce the number of IT partners and standardize the technology infrastructure and information systems. This tendency causes problems for the small software firms, because it favors the large organisations with global solutions.

The global industry representatives suggested that the small local software firms could survive in the competition by concentrating on certain competence areas or dimensions. The dimensions that we identified from the data are the level of technological ‘sophistication’, resource providing, industrial domain knowledge and the level of software engineering knowledge. These four dimensions, when mapped onto one another, yielded three business models for the small software firms to cooperate with their global industry customers (see Figure 3). In a sense, these dimensions and models serve as tools for assembling the optimum mix of strategic resources, such as human resources, technologies and partnerships, so that the necessary competitive advantage is gained (Barney, 1996).

**Figure 3** The dimensions of cooperation between the small software firms and a global industry



These business models can be characterized as ‘narrow technological solutions’, ‘resource pool’ and ‘software products’. As mentioned earlier, the global industry representatives considered the business model ‘operative business

systems' to be reserved for the globally operating software enterprises. The following examples demonstrate this global industry view:

"We have formed a partnership agreement with the big software company. According to this agreement, the big software company maintains the template according to which we will do all the local implementations... It is an important agreement, which makes this big software company our only partner in this business area..."

"Small software firms are also important but we cooperate with small ones in small business areas and with big ones in big business areas."

The forest industry representatives emphasized the possibilities for the small local firms to cooperate with them in the area of *narrow technological solutions*. The mentioned technological areas include mobile and internet technologies, the interfaces between the forest industry systems and data mining and information processing from automation systems. A business model based on expertise in any of these technological areas requires a close relationship with both the forest industry customer and universities and other research institutions. Examples of how a global industry representative considers this issue are shown below:

"This kind of work needs industrial domain knowledge and knowledge of processes..."

"To be able to provide tailored technology solutions the local small software organization should be innovative. This is more important than in other business models. It is more like research and development work, and this kind of an organization has to have the right attitude towards this kind of a work. It is a small but growing area..."

Another important business area, a software firm acting as a *resource pool*, or as one industry customer called it, 'local hands and legs', was mentioned as an important way to cooperate. This kind of cooperation could exist mainly between a small software firm and a large software enterprise, but also between a small software firm and a forest industry customer. From the global organisation point of view, the small software firms could view the agility to react as their strength. It is easy for a big customer to cope with a small organisation, which will rapidly react to any change in customer needs. In addition, the local and personal presence in startups and maintenance was considered as an important factor explaining the success of the local firms. This excerpt clearly demonstrates how a global industry representative saw the importance of this business model:

"A local service is something that needs hands and legs [...] This kind of relationship between big ones has the consequence that the local software businesses must provide more resources to bigger enterprises... They are resource banks."

The third mentioned way for cooperation between the small local software firms and the global forest industry was to *produce software products* for various business domains in the area of administrative business systems. In this area, competition is hard with many suppliers, but this kind of an approach provides a possibility to sell products to customers in other business domains, too.

"But then we have many different kinds of value added services, web-based services and extranet solutions, different kinds of administrative business systems and reporting systems. There is as much room for small software companies as in other industrial domains."

## 6 Discussion: the challenges for the small firms

Our results show that the picture of the types of small software firms is far richer than most of the available analyses (*e.g.*, Hoch *et al.*, 1999) recognize. The asymmetry between the small firms and their large industrial customers spices up the soup even more. We asked from the representatives of the large organisations their opinions about how the small software firms could continue their relationships with their large industrial customers. Our analysis led us to a view wherein each type of a small firm can be suggested a recipe for survival. For some firms, internationalization may be the solution, but for some, local presence might be the key. This differs from much of the existing research (Bell, 1995; Bell, 1997; Coviello and Munro, 1997; Moen *et al.*, 2004; Ojala and Tyrväinen, 2007), where the process of internationalization is seen as an objective and the solution for the success of the small software firms.

### 6.1 How can the small software firms cope with a global industry?

Local software development has many challenges related to the industry's globalization. Our study revealed that industrial customers are growing global through mergers and acquisitions, while most of the software organisations are not growing at the same pace. The small local software firms recognized their inability to compete with the big software organisations in the area. The global industry representatives saw the situation in the same way and gave reasons for the



situation, like the reduction of the number of partners, the standardization of the technology infrastructure and information systems and the avoidance of risks in critical business systems.

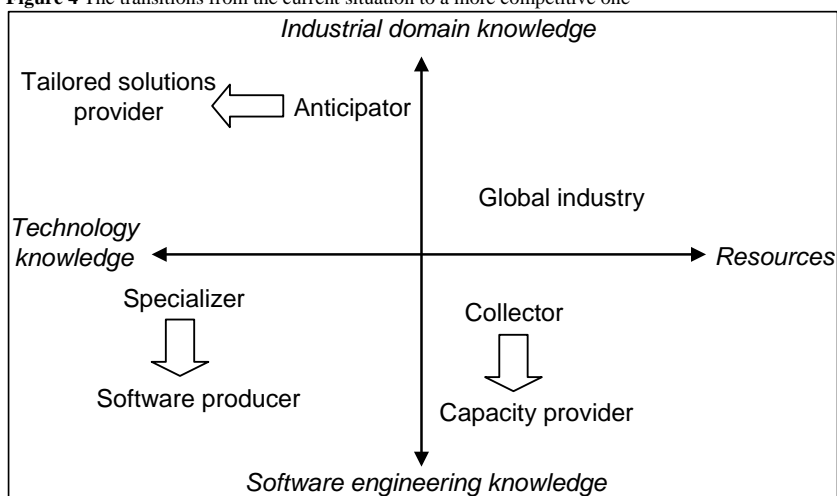
The representatives of the small software firms felt that they do not have many possibilities to compete in the same business area as the large software enterprises. Especially, the global industry representatives considered that in the future, the small software firms in the area should go further in specialization to be able to compete with the bigger software enterprises. In the following paragraphs, we propose how this specialization could happen.

The anticipators seek to apply information systems and software solutions to improve their customers' business. The anticipators could specialize in and focus on selected technology areas to be able to become *tailored solutions providers* (Figure 4). In the interviews, the technology areas mentioned by the global industry representatives were mobile and internet technologies, data mining and the interfaces from automation systems and the interfaces between various forest industry systems. They also suggested that to be able to specialize, this kind of firm should network with universities and other research institutions, as well as with the global industry customers. This kind of approach requires innovation capabilities and it could be possible to evaluate and develop these capabilities with the results of the existing research (Capaldo *et al.*, 2003).

The specializers develop their technology competence and have one or more of their own software products. This kind of firm could specialize in software packaging to be able to produce software products more efficiently, and for the global markets as well. According to our study, this kind of *software producer* (Figure 4) could concentrate on general (and perhaps, administrative) business systems and their technologies and sell products to the customers in other business domains as well. To be able to survive the hard competition in this area, this kind of firm should network with other software producers to be able to provide broader products, services and business values for the customer.

The collectors that now act like general stores could specialize in software processes and methods to be able to act as local *capacity providers* (Figure 4) for the global software organisations. The collectors could network with other collectors so that they could provide a larger resource pool for various business domains.

**Figure 4** The transitions from the current situation to a more competitive one



## 6.2 The trend of outsourcing and the small software firms

Worries about the effects of IT outsourcing and offshore software development were frequently mentioned in our interviews. During the last ten years, IT outsourcing has provoked lots of discussion and research (Dibbern *et al.*, 2004). In addition, attention has more recently been paid on global software outsourcing (Heeks *et al.*, 2001) or offshore software development (Carmel and Agarwal, 2002; Gopal *et al.*, 2002), where parts of the software development work has been transferred to lower-cost countries such as India or Russia. In our study, this trend had been recognized by the small firms, the forest industry customers and the big global software enterprises, although the small ones did not seem to emphasize this as much as the large organisations did.

For the small firms, this trend of globalization has many worrying effects. These outsourcing and offshoring processes do not benefit much small software firms, because they do not have the resources and skills to acquire and negotiate international partners. Most benefits will contribute to the large organisations that can serve large customers and have resources for international cooperation. Large software organisations, such as the big software enterprises in the area, increasingly move their jobs and subcontracts to low labour-cost countries and the position of the small local firms weakens. In addition, the decision processes of the globalizing industrial customers are centralizing and shifting out of the reach of the small software firms. For example, a large industrial company may move part of its previously local decision-making process to another country, as we observed.

Altogether, these issues are not well studied from the perspective of the small software firms in high labour-cost countries. Therefore, we need research that could analyze the situation widely and internationally. The small software firms would greatly benefit from the awareness of the situation and especially from the actions taken based on the analysis of the situation. The possible research topics could include, for example, the collection of best practices related to the survival and success of the small software firms in increasingly global competition. These best practices could be related to the business strategies, the networking with partners and the processes of software development that fit into the globalizing operating environment.

In the globalizing software industry, offshore production requires well-defined and explicitly defined processes. However, the so-called agile methods and processes (cf. Cockburn, 2001) are widely emphasized by many software development practitioners and researchers. Small software firms are very flexible and, by nature, very agile. Inevitably, the question of why the large organisations and large customers prefer rather rigid offshore development instead of agile processes arises. Research should also analyze the tendencies of the large organisations and show the strengths and weaknesses of their offshore development strategies compared to the agile processes better suited for the small software firms.

## 7 Summary

Our analysis identified three types of small software firms that we named anticipator, specializer and collector. These three types of firms differ from each other in their business processes, the number of technologies they provide, the type of customer relationships and the type of cooperation with other organisations. An anticipator can be characterized by its ability to seek and apply information systems and product solutions to improve its customer's business. A specializer typically develops its technology competence and, at the same time, can have one or more of their own software products. A collector is like a general store, which develops whatever the customer wants.

Many small software firms had recognized their inability to compete with the large software organisations. The small firms expressed their willingness to form networks so that they can better meet the global demands of their customers. Most of the small firms felt that they do not have the means and experience to form networks with each other. Our study suggests that one possibility for a small local software firm to operate with a global industry customer is to act as a local subcontractor for a global software organisation. Another possibility is to specialize in some new technology, like mobile or internet technology. In addition, the possibility to make software products for multiple business domains was mentioned. All these possibilities include many challenges for a small local firm.

Our study highlights the difficulties of and challenges for the small software firms to cope with the globalization of industries. The current research in software engineering is not particularly useful for resolving the problems of small firms, because it is mostly focused on large-scale software production and its problems. It is already noted that the field of software engineering is largely influenced by and based on the needs of large organisations like the US Department of Defense (Naur and Randell, 1969; Fayad *et al.*, 2000) and military applications, whose problems are in many ways different from the problems of the small firms. In addition, many of the solutions that we can propose for the small firms are not directly related to enhancing software engineering methods and processes. In many cases, it could be more useful for small software firms to enhance their industrial domain knowledge and customer relationships than to improve their software development processes.

Based on the results of this study, we cannot answer unambiguously the question of how the small and local software firms could continue their cooperation with their globalizing customers. Therefore, we need more research that could analyze the situation more widely and internationally. However, the findings of our study suggest that the small software firms do not have the possibilities to compete in the same business areas as the global software enterprises. Instead, the small software firms must specialize and network to become more competitive suppliers and partners. A deeper specialization in technologies, industry domains or software processes and methods could give better tools for the small software firms to survive in the increasing and globalizing competition.

## References

- Arora, A., Aranuchalam, V.S., Asundi, J. and Fernandes, R. (1999) 'The Indian software industry', *Research Policy*, Vol. 30, No. 8, pp.1267–1287.
- Barney, J.B. (1996) *Gaining and Sustaining Competitive Advantage*, Pearson Education.
- Bell, J. (1995) 'The internationalization of small computer software firms: a further challenge to "stage" theories', *European Journal of Marketing*, Vol. 29, pp.60–75.
- Bell, J. (1997) 'A comparative study of the export problems of small computer software exporters in Finland, Ireland and Norway', *International Business Review*, Vol. 6, pp.585–604.
- Blomqvist, K. (2002) *Partnering in the Dynamic Environment: The Role of Trust in Asymmetric Technology Partnership Formation*, Lappeenranta University of Technology, Lappeenranta.
- Boltramovich, S., Yurkovsky, V., Filippov, P. and Hernesniemi, H. (2005) *Russian Infrastructure Clusters: A Preliminary Study*, Discussion Paper No. 968, The Research Institute of the Finnish Economy.
- Brouthers, K.D. and Van't Kruijs, Y.M. (1997) 'Competing in software: strategies for Europe's niche businesses', *Long Range Planning*, Vol. 30, pp.518–528.
- Capaldo, G., Iandoli, L., Raffa, M. and Zollo, G. (2003) 'The evaluation of innovation capabilities in small software firms: a methodological approach', *Small Business Economics*, Vol. 21, pp.343–354.
- Carmel, E. and Agarwal, R. (2002) 'The maturation of offshore sourcing of information technology work', *MIS Quarterly Executive*, Vol. 1, pp.65–77.
- Carmel, E. and Sawyer, S. (1998) 'Packaged software development teams: what makes them different?', *Information Technology & People*, Vol. 11, pp.7–19.
- Cockburn, A. (2001) *Agile Software Development*, Addison-Wesley.
- Coviello, N. and Munro, H. (1997) 'Network relationships and the internationalization process of small software firms', *International Business Review*, Vol. 6, pp.361–386.
- Cusumano, M. (2004) *The Business of Software: What Every Manager, Programmer and Entrepreneur Must Know to Thrive and Survive in Good Times and Bad*, Free Press.
- De Fontenay, C. and Carmel, E. (2004) 'Israel's Silicon Wadi: the forces behind cluster formation', in T. Bresnahan and A. Gambardella (Eds.) *Building High-Tech Clusters: Silicon Valley and Beyond*, Cambridge University Press.
- Denzin, N. (1978) *The Research Act: A Theoretical Introduction to Sociological Methods*, McGraw-Hill.
- Dibbern, J., Goles, T., Hirschheim, R. and Jayatilaka, B. (2004) 'Information systems outsourcing: a survey and analysis of the literature', *SIGMIS Database*, Vol. 35, pp.6–102.
- Doz, Y.L. (1988) 'Technology partnerships between large and smaller firms: some critical issues', in F.J. Contractor and P. Lorange (Eds.) *Cooperative Strategies in International Business*, Massachusetts: Lexington Books.
- Fayad, M.E., Laitinen, M. and Ward, R.P. (2000) 'Software engineering in the small', *Communications of the ACM*, Vol. 43, pp.115–118.
- Glaser, B. and Strauss, A.L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Chicago: Aldine.
- Gopal, A., Mukhopadhyay, T. and Krishnan, M.S. (2002) 'The role of software processes and communication in offshore software development', *Commun. ACM*, Vol. 45, pp.193–200.
- Grant, R.M. (2002) *Contemporary Strategy Analysis*, Blackwell Publishing.
- Groves, L., Nickson, R., Reeve, G., Reeves, S. and Utting, M. (2000) 'A survey of software development practices in the New Zealand software industry', *Australian Software Conference 2000, Proceedings*, Gold Coast, Queensland, Australia, 3–6 December 2002, pp.189–201.
- Heeks, R., Krishna, S., Nicholson, B. and Sahay, S. (2001) 'Synching or sinking: global software outsourcing relationships', *Software, IEEE*, Vol. 18, pp.54–60.
- Hoch, D., Roeding, C., Purkert, G., Lindner, S. and Muller, R. (1999) *Secrets of Software Success: Management Insights from 100 Software Firms Around the World*, Harvard Business School Press.
- Hofer, C. (2002) 'Software development in Austria: results of an empirical study among small and very small enterprises', *Proceedings of the 28th Euromicro Conference (EUROMICRO'02)*, Dortmund, Germany, IEEE Computer Society, 4–6 September 2002, pp.361–366.
- Isaksen, A. (2004) 'Knowledge-based clusters as urban location: the clustering of software consultancy in Oslo', *Urban Studies*, Vol. 41, pp.1157–1174.
- Jokinen, J., Hietala, J., Mäkelä, M., Huurinainen, P., Maula, M., Kontio, J. and Autio, E. (2004) *Finnish Software Product Business: Results from the National Software Industry Survey 2004*, Helsinki University of Technology, Software Business Laboratory, Institute of Strategy and International Business.
- Klein, H.K. and Myers, M.D. (1999) 'A set of principles for conducting and evaluating interpretive field studies in information systems', *MIS Quarterly*, Vol. 23, pp.67–94.
- Locke, K. (2001) *Grounded Theory in Management Research*, Sage Publications.
- Martin, P.Y. and Turner, B.A. (1986) 'Grounded theory and organizational research', *The Journal of Applied Behavioral Science*, Vol. 22, pp.141–157.
- Moen, Ø., Gavlen, M. and Endresen, I. (2004) 'Internationalization of small, computer software firms: entry forms and market selection', *European Journal of Marketing*, Vol. 38, pp.1236–1251.
- Nathan Associates Inc. (2003) *Software and the U.S. Economy in 2002*, Business Software Alliance.
- Naur, P. and Randell, B. (Eds.) (1969) *Software Engineering: Report on a Conference Sponsored by the NATO Science Committee*, Brussels, Scientific Affairs Division, Garmisch, Germany, 7–11 October 1968.
- Nikula, U., Jantunen, S., Saarelainen, T. and Lampinen, J. (2005) 'Kaakkois-Suomen ICT-klusterin yritys selvitys', *Tutkimusraportti*, Lappeenranta teknillinen yliopisto, Lappeenranta.

- Ojala, A. and Tyrväinen, P. (2007) 'Business models and market entry mode choice of small software firms', *Journal of International Entrepreneurship*, Vol. 4, pp.69–81.
- Porter, M.E. (1985) *Competitive Advantage*, New York: The Free Press.
- Rajala, R., Rossi, M., Tuunainen, V.K. and Korri, S. (2001) 'Software business models: a framework for analyzing software industry', *Technology Review 108/2001*, The National Technology Agency of Finland, Helsinki.
- Sallinen, S. (2002) *Development of Industrial Software Supplier Firms in the ICT Cluster: An Analysis of Firm Types, Technological Change and Capability Development*, University of Oulu.
- Strauss, A.L. and Corbin, J. (1990) *Basics of Qualitative Research: Grounded Theory Procedures and Applications*, Newbury Park, CA: Sage Publications.
- Tähtinen, J. (2000) *The Dissolution Process of a Business Relationship: A Case Study from Tailored Software Business*, University of Oulu.
- US Census Bureau (2005) County Business Patterns 2003, <http://censtats.census.gov/cbpnaic/cbpnaic.shtml> (accessed 21 September 2005).

## **Publication IV**

Originally published in G. A. Papadopoulos, G. Wojtkowski, W. Wojtkowski, S. Wrycza & J. Zupancic (Eds.):  
Information Systems Development. Towards a Service Provision Society, Springer, United States of America, pp. 569 –  
577, with permission of Springer.



# Organizational learning literature visited – Fresh lenses to study practices in ISD organizations?

Pasi Juvonen<sup>1</sup> & Päivi Ovaska<sup>1</sup>

<sup>1</sup>South Karelia University of Applied Sciences, Finland. [pasi.juvonen@scp.fi](mailto:pasi.juvonen@scp.fi), [paivi.ovaska@scp.fi](mailto:paivi.ovaska@scp.fi)

**Abstract.** This paper presents results of a study, in which the literature related to organizational learning (OL) and learning organization (LO) also in disciplines outside information systems (IS) was studied. The results of the literature review were classified based on the proposed framework. Based on the framework, organizations tend to learn from direct experience, from the experience of others or by developing conceptual frameworks or paradigms for interpreting that experience. The paper also represents some expressions from empirical data related to the subjects. The results suggest that studies made in other disciplines might provide the IS community some fresh lenses and insights to study OL and LO. The results also suggest that there exists a difference between canonical practices and non-canonical practices in the ISD organizations studied. Implications of these differences and the need for more empirical research related to the OL and LO are also discussed in the paper.

Keywords: organizational learning, learning organization, information systems development, grounded theory

## 1. Introduction

During the recent decade rapid ICT development in Eastern Europe and Far East has affected to the business models and the value chains in the ICT industry worldwide. As a part of the change, learning and innovativeness have become crucial factors in the organizations survival. Furthermore, management of the change has become one of the major challenges for the organizations (Schein 1993). In the same time it has been reported by several authors that organisations have failed to learn from their previous experiences (i.e. Edmondson 2002; Newell et al. 2006).

Organizational learning (OL) studies have its origins in management studies. Parallel with OL the concept of learning organization (LO) has been developed being strongly emphasized by consultants. During the past decade OL and LO have become more popular subjects for study also in IS discipline. The subjects for the OL related studies have varied from knowledge creation and management to intelligence information retrieval systems and groupware. These approaches that usually try to build an organizational memory by information systems are usually referred as “ICT approach” (Chen et al. 2003) or “technical approach” (Easterby-Smith and Araujo 1999). The approach has its advocates but the results gained have in many cases been controversial or in certain organizational settings even detrimental. It is in place to argue that these approaches are still lacking real success stories and some fresh lenses might be useful in future. Furthermore, studies using so-called social approach have shown us some fruitful results (i.e. Elkjaer 1999; Easterby-Smith et al. 2004, Dierkes et al. 2001).

The evaluation of the research made in other disciplines such as organization science and management science has showed that there are numerous different lenses used to study organizational learning from social viewpoint also. Furthermore, when preparing a manuscript for an article the literature study is usually restricted only to the literature related to researchers own discipline. Although learning rate has been proven to be dependent i.e. on time, industry and product (Dutton and Thomas 1984) viewpoints from other disciplines might be useful also to IS discipline to recognize. Therefore, the motivation for this study was to familiarize ourselves to some fresh viewpoints to OL and LO concepts that has been studied in other disciplines than IS. The empirical data collected was also analyzed in the light of these viewpoints. Implications of the literature study and the observations made from the empirical data collected in ISD organizations are also discussed.

This paper is organized as follows. Next section gives the results of the literature study related to organizational learning. In section three the research process and empirical data is introduced. Furthermore, we present the observations on the empirical data. In section five, the results of the study are discussed along with its limitations. Finally, summary and future work is presented.

## 2. Organizational learning literature

The objectives of the literature study were to also look around to the studies that have been made related to OL within other disciplines and provide some results from studies emphasizing social view to the IS community.

The literature study was made between August 2007 and January 2008. Articles related to OL and LO were searched from six journals (MISQ, Organizational Learning, Management Learning, Organization science, European Journal of Information Systems and Information Technology & People). In addition some conference article databases (i.e. ACM) were used. The first round of the information retrieval process provided us about 180 interesting articles. After selecting a proper blend of

articles, theoretical sampling (Strauss and Corbin 1990; Denzin 2003) was used to make another round of information retrieval. The criteria used in the selection process were that the article should present either interesting results from social viewpoint or present constructive criticism of past OL or LO research. The objective of this second round was to find out where well known and references articles of this area were and what kind of criticism has been presented against the mainstream of the research area.

### **Concepts and terminology**

OL has been defined in many different ways. In general, learning and knowledge are seen interrelated to each other. In several studies learning is seen as a process and knowledge is seen as a product of this process (learning).

OL has concentrated to address the observation and analysis of individual and collective learning inside organizations (Easterby-Smith et al. 1999). Learning organization (LO) is seen as counterpart for OL (Elkjaer 1999). LO is also seen as an organization that is continually expanding its capacity to create future; Senge (1990) sees learning either as adaptive (learning to cope) or generative (learning to create). Furthermore, learning has been seen either as a single-loop or as a double-loop learning (Argyris 1992). Terms incremental and radical have also been widely used to describe different learning types.

Another essential definition in OL / LO field is relation between learning and knowledge. It has been well defined by Vera and Crossnan (2003): "*Learning and knowledge are intertwined in an iterative, mutually reinforcing process. While learning (the process) produces new knowledge (the content), knowledge impacts future learning*". Traditionally, formal training is seen to produce learning and new knowledge. In practice, this is not always the case; training is rather a possibility to learning (Tosey 2005).

### **Literature in IS discipline**

The OL and the LO have also been studied in the IS discipline. This chapter will shortly represent some previous studies made related to the subjects. Lyytinen and Robey (1999) have pointed out that ISD organizations have failed to learn because of barriers of learning and limits of organizational intelligence. They argue that in the course of time organization event tend to accept failure and learn to fail. Furthermore, Lyytinen and Rose (2006) have made an empirical study of ISD agility as OL. They found out that agility to move from exploring new technologies to exploit new technologies is valued in organizational context as a part of three other factors: innovativeness of the content, quality and cost.

Social defenses in information systems development have been studied by Wastell (1999). Wastell have found out that there exists several social defense modes of group behaviour that hinder or even paralyze the learning processes that are crucial for successful ISD project. When employees are stressed of problematic situations they tend to operate defensively which creates a negative feedback loop. In a normal learning situation a problematic situation poses a problem oriented action that fosters learning (Wastell 1999). The practices how to break through the defenses and release the learning process are discussed in his study.

OL opportunities during advanced ISD have been studied by Stein and Vandenbosch (1996). They argue that systems development and implementation are an opportunity for OL, especially double-loop learning, because during the development and implementation the underlying values and norms are often questioned at that stage. Stein and Vandenbosch (1996) have identified five critical success factors that affect the learning. These factors were: orientation of developers (technical or managerial), development focus (process vs. product), development paradigm (learning vs. engineering), view of expertise (expert in context vs. expert in isolation) and developer-expert interaction (double-loop vs. single-loop learning behaviors).

### **Literature in other disciplines**

Lave and Wenger (1991) have presented a concept "Community of practice" (CoP) that has also been referred as "Community of practioners". Lave and Wenger have situated learning in the trajectories of participation in which it takes on meaning. They see that these trajectories must themselves be situated in the social world (Lave and Wenger 1999). The concept of CoP's has been expanded by Brown and Duguid (1991). In their study an organization is seen as a community of communities, where OL and CoP's are tied together to present unified view of working, learning and innovation (Brown and Duguid 1991). This approach is called a socio-cultural perspective and its sees human contact and social setting as drivers for OL. Orr's studies of service technicians are also referred to show how training of technicians and what their do in practice (non-canonical practices) are far from the ways that organizations describe their (canonical) practices in i.e. manuals (Orr 1987).

Unsystematic and unintentional learning seem to be very common (Huber 1991). However, there are still quite few studies that have been focused on this. Lave and Wenger (1991) have studied several different CoP's. They have argued that conventional teaching or training within CoP's has almost no significance. The context of learning and informal community as part of it has been found essential in learning by doing (Lave and Wenger 1991; Brown and Duguid 1991; Orr 1987; Kolb 1984).

### **Classification of organizational learning literature**



A good review of OL literature and its theoretical roots has been conducted by Levitt and March (1988). They have presented that the ways how organizations learn can be classified to three categories that are: 1) *from direct experience* 2) *from the experience of others* 3) *develop conceptual frameworks or paradigms for interpreting that experience*. A short summary of literature that was evaluated during the literature study is presented in table 1.

Table1. A summary of the literature found from other disciplines.

Type of learning (Levitt and March 1988)	Author(s)	Scope of the study	Key suggestions(s) interpreted
1,2	Orr (1987)	Service technicians in training and in work.	Actual practices are far from canonical practices.
1,2	Senge (1990)	Concept of LO – LO is seen as an ultimate target for an organization.	Five disciplines: 1) Personal mastery 2) Mental models 3) Shared vision 4) Team learning 5) Systems thinking.
1,2,3	Lave and Wenger (1991)	Learning within several different communities of practioners (CoP's).	All knowledge is socially constructed, learning is socially situated.
1,2,3	Argyris (1990, 1992, 1993)	Single and double loop learning.	Organizational defenses in individual level and lack of openness play a major role in inhibiting OL.
1,2,3	Argyris and Schön (1996)	Two ways to handle conflicts in organizations.	Differences exist between espoused theory and theory in-practice.
1,2	Brown and Duguid (1991)	Differences between canonical and non-canonical practices.	An organization is a community of communities where practice, learning and innovativeness cannot be separated.
1,2	Newell et al. (2006).	Knowledge sharing between ICT projects.	“Re-inventing the wheel” in ISD projects is common.
1	Edmondson (2002)	Group level learning.	Types of groups: 1) No reflection of practices 2) Reflection of practices but no changes 3) Reflection and change of practices.
1	Adler and Cole (1993)	A tale of two auto plants.	In car industry “democratic taylorism” seems to be superior method to gain efficiency and foster learning.
1,2,3	Hardagon and Bechky (2006).	Interactions that benefit creativeness among communities.	Four basic interactions: 1) Help seeking 2) Help giving 3) Reflective reframing 4) Reinforcing.

### 3. Research process and revisited empirical data

A total of 36 in-depth interviews lasting from one to three hours were made in six Finnish ISD organizations during the previous research project we were participating. The interviews concentrated on processes, methods and practices in ISD organizations. During this study the data from the past research project was revisited and a new viewpoint to the data was taken for analysis.

The data was analyzed with grounded theory method (Strauss and Corbin 1990). When using grounded theory method researchers needs theoretical sensitivity (Denzin 1978). When interesting phenomenon is met a theoretical sampling is used to gather more data of it to be able to understand what is going on. Hence, to be able to better understand the phenomena found during the analysis it was decided to carry out five expert interviews in Midlands, Ireland in Irish ISD organizations. During the interviews in Ireland a new seed category, *usefulness of the created knowledge during ISD project*, was emphasized. The objective of this new category was to first enquire the interviewees what kind of practices they use in their organization (canonical practices) and after that, ask them to evaluate those practices. The interviewees were eager evaluate their canonical practices and in the same time also to express strengths of their hands-on (non-canonical) practices. Differences in these practices and reasons for the differences were also discussed during the interviews made in the Irish ISD organizations.

Based on the methodological instructions related to grounded theory method, the data collection should be continued until the data is saturated (Strauss and Corbin 1990). In other words when the same phenomena start to repeat themselves in the extra interviews made, there is no reason to continue data collection for that category. In this case the category *usefulness of created knowledge during ISD project* was saturated after five extra interviews. For the analysis of the empirical data the research question was formulated as follows:

*What kind of evidence of organizational learning theories can be seen in information systems development projects?*

The analysis of the empirical data included open coding, axial coding and selective coding phases (Strauss and Corbin 1990). First the interviews were transcribed to ACSII text and stored to Atlas.ti program. After that a three phase analysis was started. In the open coding phase all the interesting phenomena related to seed category were marked (as a code). The open coding phase produced almost 1600 codes. The analysis continued with the axial coding where these codes were regrouped and relations (is cause of, is associated with) between them were searched. The analysis ended with the selective coding. During the selective coding the most interesting phenomena were selected and an interpretation of “what is going on” was written.

#### 4. Observations on empirical data

Re-inventing the wheel has been found to be common in all kinds of organizations all over the world despite their location and across the industries. When a new project is starting, there is a tendency to reinvent the wheel rather than learn from the experiences of previous projects (Newell et al 2006). Furthermore, companies tend to store product information rather than problem solving experiences to their databases. This has been one of the reasons why individuals don't feel the stored knowledge useful for themselves. These previous findings are also supported by our empirical data. In Table 2 there are some examples of expressions from the interviews.

Table 2. Citations from the interviews related to usefulness of documentation.

#	Citation	Role & Company
1	"...The problem is that after ten weeks you don't remember what was agreed. Documentation does not much help the situation because the documents are not usually read..."	CRM manager, company X
2	"...We have also predefined documents but we are not using them very much..."	Project manager, company X
3	"...When we are in hurry the documentation is not updated and it becomes useless..."	Project manager, company Y
4	"...Sometimes I think the processes could have been streamlined better in XXXXXX. Seemed to be an awful lot of unnecessary documentation..."	Analyst, company Z
5	"...It's strange because when you had something like... it's like you don't really want to let management know about it because you think if this becomes a formal process; it becomes something else that has to be reviewed and will this be better that way, I don't know..."	Analyst, company W

These expressions presented in table 2 support the results gained in previous studies. It seems that employees tend to use practices they find useful and ignore those that they find useless as has been stated in behavioral theory of the firm (Cyert & March 1963). These expressions also might implicate, that there probably exists a difference between canonical practice that has been written to organizations manuals or certificates, and actual practices used among different communities of practice inside an organization. Formal documentation is in some cases avoided by using unofficial ways to store useful information.

Another viewpoint that was taken during the analysis of the empirical data was the existence of communities of practice and team learning among organizations studied. We were interested if it was possible to recognize CoP's or team level work practices based on the empirical data. Furthermore, we were interested if we could be able to find out how individuals in CoP's felt the managerial interventions directed on them. This viewpoint also includes team working and innovativeness. Before individuals commit themselves to teamwork, appropriate conditions have to exist (Senge 1990). Innovativeness is seen to be developed within CoP's (Brown and Duguid 1991; Hardagon and Bechky 2006). The expressions from the interviews presented in table 3 show how interviewees saw the situation in their organization.

Table 3. Citations from the interviews related to CoP's.

#	Citation	Role & Company
6	"Q: Do you see any areas where you could do better? A: Nothing special... but at least management should bear in mind that we are all human beings. Some of us communicate more than others. Too much surveillance and control cannot be good. We have already continuous rush, continuous lack of resources. Mainly stick instead of carrot is used for motivate employees. Employees will in longer burn out..."	Project manager, company Y
7	"...Our organization chart changes about once per year. These changes cause uncertainty and it decelerates our working..."	Project manager, company Y
8	"...I tried to get people from XXXXX and YYYYY into my small project but I couldn't do that because project managers said that they don't have time and they are very jealous of their work and so on..."	Project manager, company X
9	"... Employee has to be able to work with those methods and processes that we have, or she will not work for us any longer. We approve that one is slower than another but work has to be done according to our processes and quality requirements..."	Vice president, company W
10	"... You don't in many cases have time to make documentation or design tests..."	Analyst, company W

An interpretation that emerges from the citations 6 and 7 is that in "crisis" situations managers in case company Y seems to increase surveillance and bureaucracy. These kinds of actions are not seen to foster problem solving skills and capacity among employees; instead it is likely to raise defensiveness in individual level and increase barriers of learning (Argyris 1990, 1992, 1993).

An interpretation of citation 8 is that a project manager of company X probably tried to build a project group of suitable employees from different locations inside the company. A proper set of suitable employees from different positions around the company would make it possible to have fruitful brainstorming sessions in the beginning of a new project and also to use reflective reframing to cope with upcoming challenges during the project. When employees from different positions would form a project organization they could be able to reflect their previous experiences in a new situation (Hardagon and Bechky 2006). Furthermore, if organizations policy would allow one to utilize appropriate employees from different CoP's it would inevitably foster learning by increasing information sharing across CoP's.

The citations 9 and 10 raise a question if management in company W sees ISD as “a software factory” or is it seen as a practice of creative human beings. It seems that the manager interviewed sees a company as a software factory where analysts strictly follow the processes, methods and quality standards given from the management (canonical practices). Respectively, an analyst of company W from his own viewpoint sees that the most important issue is to “handle the job in hand” whether the quality requirements are met or not. As it was argued before, if documentation that is done during ISD project is seldom accessed after project is done, the differences between described practices and actual practices in company W might never be exposed.

## **5. Discussion**

The empirical data gave us some evidence that hands-on practices in ISD organizations are far from official practices how organizations describe their way of operating. Employees in ISD organizations tend to abandon practices and rules they find useless and replace them with ones they find useful. In some cases this is done on the lam of organizations management.

If organizations structure is continuously changing and CoP’s are broken or employees are pressed to follow strict canonical processes it will break the soil for motivation, commitment and innovativeness to develop. Most of the ISD organizations worldwide are nowadays seeking for short-term business profits and searching more productivity by developing their canonical methods, processes and practices. We suggest that more concern should be paid on long-term objectives such as well-being of the personnel.

The OL and LO and numerous concepts that relate to them in several disciplines will probably remain fuzzy for the most of IS researchers until more empirical research is made to gain more insights to the area. As several studies have already pointed out, nature of learning in organizations varies across industries and time, so when i.e. organizational structure or technology used in ISD projects changes in the same time new challenges of OL emerge.

There are naturally several limitations in this study. First, we were able to conduct only a minor intersection of the OL and LO literature. There would be numerous additional interesting results available i.e. in knowledge management and IS discipline to explore. Though the literature review was limited, this is usually the case in most of the studies made so we do not see this as a major limitation.

Another limitation of the study obviously is the nature of empirical data we used to make our observations. The data was originally collected to study information systems development methods, processes and practices used in Finnish ISD organizations. However, when our interest started to wheel toward OL and LO we were able to use theoretical sampling and adjust interview questions before interviews in Irish ISD organizations. When a retrospective examination to the original data collected in Finland was made, we felt that totally fresh lenses were provided to us for the analysis and we supposed that there were not much bias in the interviews. Anyway, we believe that the data would have been much richer if the original focus in the all interviews were been in OL and LO.

As a third limitation of this study we have to admit that part of the literature study was made before analyzing the data. This was because at first OL and LO were studied as a separate subjects but in a later phase we became interested to combine lenses provided by OL and LO literature to the past research concerning methods, processes and practices. If the grounded theory method would be strictly followed there should not have been any previous literature study of the subject that was studied. This instruction is unquestionably given to avoid any bias in interviews and data analysis. This third limitation was mitigated by utilizing investigator triangulation (Denzin 1978) during the analysis of the data.

As it has been pointed out in several previous studies made outside IS discipline that learning depends on context where it takes place (Lave and Wenger 1991). These studies also suggest that learning is usually far from canonical procedures i.e. how the manuals and training programs (Brown and Duguid 1991) describes working procedures. In addition, learning varies at least across industries, products and time (Dutton & Thomas 1984). Therefore, there is doubtless need for more empirical research related to OL and LO in the IS discipline.

## **6. Summary and future work**

In this paper, we have tried to provide the IS community some fresh lenses to OL and LO research. The creation, managing, communicating and retrieving new knowledge are in any case focal part of any project. Therefore, we analyzed the OL and LO literature in different disciplines. We also used OL lenses to the empirical data gathered from six Finnish ISD organizations.

Our study suggests that within the IS discipline OL and LO subjects might have some unexplored areas. The study also argues that there is some theoretical diversity related to the subjects, also discussed in (Chiva and Alegre 2005). The study also suggests that other disciplines have provided us amply of interesting results that have helped several organizations to learn and solve new challenges in their ISD projects.

The empirical data analyzed suggests that differences between canonical and non-canonical practices in ISD organizations might be useful to explore in more detailed level. The useless processes, methods and practices may even be detrimental to organization in a longer run because when employees find canonical methods, processes or practices useless they tend not to follow them. In addition, organizations will probably miss opportunities to learn when useful hands-on practices are not discussed or even recognized by the managers of an organization.

There are inevitably several similarities in practices of ISD organizations in Western European organizations even differences in organizational culture and culture related issues have shaped the organization in the course of the time. However, there are not so much studies related to differences in practices in ISD organizations operating worldwide where OL and culture have been used as lenses in the same time. A deep culture-related analysis between i.e. Finnish and Irish ISD organizations might provide us some fresh insights to understand phenomena related to OL and LO in organizations that operate in different cultural districts. Though its limitations, the study gave the authors a good entry point to OL and LO studies and will serve as a baseline for further empirical studies related to the subjects.

## References

- Adler, P & Cole, R. (1993). *Designed for learning: A Tale of Two Auto Plants*. Sloan management review, Spring 1993, Vol. 34, No.3.
- Argyris, C. (1990). *Overcoming Organizational Defences – Facilitating Organizational Learning*. Prentice-Hall, Englewood Cliffs, NJ.
- Argyris, C. (1992). *On Organizational Learning*. Blackwell Publishers Ltd.
- Argyris, C. (1993). *Knowledge for Action – A Guide to Overcoming barriers to Organizational Change*. Jossey Bass, San Francisco, CA.
- Argyris, C. & Schön, D. (1996). *Organizational Learning II – Theory, Method and Practice*. Addison-Wesley, Reading.
- Brown, J. & Duguid, P. (1991). *Organizational Learning and Communities of Practice; Toward a Unified view of Working, Learning and Innovation*. Organization Science, Vol 2, No. 1, February 1991.
- Chen, J., Lee, T., Zhang, R. & Zhang Y. (2003) *System Requirements for Organizational Learning*. Communications of the ACM, December 2003, Vol 46, No 12.
- Chiva, R. & Alegre, J. (2005). *Organizational Learning and Organizational Knowledge: Towards the Intergration of Two Approaches*. Management Learning, March 2005, Vol. 36, No. 1.
- Cyert, R., M. & March J. G. (1963) *Behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice Hall.
- Denzin, N. (1978). *The research act: A theoretical introduction to sociological methods*. McGraw-Hill.
- Denzin, N.K. & Lincoln, Y.S. (editors). *Collecting and Interpreting Qualitative Materials*. Sage Publications 2003.
- Dierkes, M., Antal, A., Child, J. & Nonaka, I. (eds.) (2001). *Handbook of Organizational Learning and Knowledge*. Oxford University Press.
- Dutton, J. M. & Thomas, A. (1984). *Treating progress functions as managerial opportunity*. Academic Management Review, Vol. 9 pp. 235 – 247.
- Edmondson (2002). *The Local and Variegated Nature of Learning in Organizations: A Group-level Perspective*. Organization Science, March / April 2002, Vol. 13, No. 2.
- Easterby-Smith, M., Antonacopoulou, E., Simm, D. & Lyles, M. (2004). *Constructing contributions to Organizational Learning*. Management Learning, Dec 2004, Vol. 35, No.4. pp. 317-380.
- Easterby-Smith, M. & Araujo, L. (1999) *Organizational Learning: Current Debates and Opportunities* In: Easterby-Smith, M., Burgoyne, J. & Araujo, L. (eds) *Organizational Learning and the Learning Organization*. Sage Publications.
- Elkjaer, B. (1999). *In Search of Social Learning Theory*. In: Easterby-Smith, M., Burgoyne, J. & Araujo, L. (eds) *Organizational Learning and the Learning Organization*. Sage Publications.
- Hargadon, A. & Bechky, B. (2006). *When Collections of Creatives Become Creative Collectives: A Field Study of Problem Solving at Work*. Organization Science, July/August 2006, Vol. 17, No. 4.
- Huber, G. P. *Organizational learning: The Contributing processes and the literatures*. Organization Science, Vol. 2, No. 1, February 1991.
- Kolb, D. (1984). *Experimental Learning. Experience as The Source of Learning and Development*. Englewood Cliffs, New Jersey: Prentice Hall.
- Lave, J. & Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press 1991.
- Levitt, B. & March, J. (1988) *Organizational Learning. Annual review of sociology*. Vol. 14, pp. 319-340.
- Lyytinen K. & Robey, D. (1999). *Learning failure in information systems development*, Information Systems Journal, April 1999, Vol. 9, No. 2.
- Lyytinen, K & Rose, G. M (2006). *Information system development agility as organizational learning*. European Journal of Information Systems, April 2006, Vol. 15, No 2.
- Newell, S., Bresnen, M., Edelman, L. Scarbrough, H. & Swan, J. (2006). *Sharing Knowledge Across Projects: Limits to ICT-led Project Review Practices*. Management Learning, June 2006, Vol 37, No 2.
- Orr, J. (1987). *Narratives at Work: Story Telling as Cooperative Diagnostic Activity*. Field Service Manager, pp. 47-60.
- Schein, E. (1993). *How Can Organizations Learn Faster? The challenge of entering the Green Room*. Sloan management review. Winter 1993, Vol. 34, No.2.
- Senge, P. (1990) *The Fifth Discipline – The Art & Practice of the Learning Organization*. Sage, New York.
- Stein, E. & Vandenbosch, B (1996). *Organizational learning during advanced system development: Opportunities and obstacles*. Journal on Management Information Systems, Vol. 13, No. 2.
- Strauss, A. L. and J. Corbin (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Applications*. Newbury Park, CA, Sage Publications.
- Tosey, P. (2005). *The Hunting of the Learning Organisation: A Paradoxical Journey*. Management Learning, September 2005, Vol. 36, No 3.
- Vera, D. & Crossnan, N. (2003). *Organizational Learning and Knowledge Management: Toward an Integrative Framework*. in M. A. Lyles and M. Easterby-Smith (eds) *The Blackwell Handbook of Organizational Learning and Knowledge Management*, pp. 122-142. Oxford: Blackwell Publishing.
- Wastell, D. (1999). *Learning Dysfunctions in Information Systems Development: Overcoming the Social Defenses With Transitional Objects*. Management Information Systems Quarterly, Vol. 23, No. 4.



## **Publication V**

Originally published in C. Barry, K. Conboy, M. Lang, G. Wojtkowski & W. Wojtkowski (Eds.): Information Systems Development. Challenges in Practice, Theory, and Education. Vol. 2, Springer, United States of America, pp. 687 – 698, with permission of Springer.





# Evaluating the Driving Factors and the Suppressing Factors Related to IS Outsourcing in Four Finnish Information Systems Organizations

Pasi Juvonen

South Carelia Polytechnic, Faculty of Technology, pasi.juvonen@scp.fi

**Abstract.** This paper presents the results of a research project, in which the current situation related to the information systems (IS) outsourcing practices in four Finnish information systems development organizations was evaluated. The evaluation was based on employees' own perceptions, and it consisted of analyzing the current IS outsourcing practices in the case companies, driving factors related to IS outsourcing, suppressing factors related to IS outsourcing, and an evaluation of the company's readiness to utilize IS outsourcing. This qualitative study used grounded theory as the research method. The analysis elicited that the IS outsourcing decisions in these case companies have been mostly based on cost-related factors. The cost pressures are coming both from the shareholders and the customers. Cost reduction seemed to be the major single driver for outsourcing information system development (ISD) work. Besides, even if most of the case companies have already outsourced parts of their ISD projects, based on the interviewees' expressions the cost savings in these projects have not been remarkable. In some cases the total costs of the project have been estimated to be even higher. However, the case companies seem not to be familiar with the cost structure of the outsourced projects. The interviewees also felt that their company's ISD practices were not ready for the use of outsourcing. The level of English skills and the lack of domain knowledge among subcontractors were the other mentioned suppressing factors related to IS outsourcing.

## 1 Introduction

Globalization of industries has naturally affected also the ICT industry. Several trends are going on in the ICT field right now. ICT service providers have been consolidated into large multinational enterprises. New ways of developing software, i.e. distributed or virtual software teams and participation in open source software projects, have also come up. Since Eastman Kodak made its decision to outsource its IT operations to IBM Corporation in 1989 (Senn and Gefen 1999), information systems and software development outsourcing have become a trend in the ICT field. The changes that IS outsourcing will cause have a significant impact on economics of software business worldwide.

One of the recent trends mentioned in the field of ICT has been the outsourcing of information technology work and concentrating it to larger organizations (Dibbern, Goles, Hirschheim and Jayatilaka 2004). This trend has in recent years focused on offshore software development. The main drivers behind the offshore software development are the needs to reduce software development costs (Kakabadse and Kakabadse 2002) and to gain access to a huge resource pool and latest technologies (Marcus 2004). Countries such as India, Russia and China have in recent years become significant players in this market.

Software companies in high labour cost countries encounter a totally new challenge in this situation. Their development methods, processes, practices, business models, and business networks require reorganization. Either they must somehow utilize IS outsourcing and make profit out of it, or they must find other solutions to be efficient and profitable in this new situation.

This paper introduces the current situation related to IS outsourcing in four Finnish ISD organizations. It presents their current cooperation practices and discusses the driving factors and the suppressing factors that affect the company's decision to outsource or not to outsource parts of its ISD projects.

## 2 Literature Review

The outsourcing in the ICT industry is not a new phenomenon. It originated from the professional services and facility management services in the financial and operation support areas during the 1960s and 1970s (Lee). The outsourcing has little by little become a serious strategic choice for ICT companies. In recent years IT outsourcing has also been a

subject of numerous studies in several different disciplines. This literature study was first made in October 2006, and it was updated in the beginning of April 2007. Generally, outsourcing has been defined as a management approach that allows delegating operational responsibility for processes or services previously delivered by an enterprise to an external agent (Swink 1999; Elmuti and Kathawala 2000). IT outsourcing has been defined as a practice where IT assets and resources are transferred to a third party (Willcocks and Kern 1998; Gilley and Rasheed 2000).

Literature related to information technology outsourcing is plentiful. Several terms are used in the literature interchangeably addressing the same issue, i.e. information technology (IT) outsourcing and information systems (IS) outsourcing. Furthermore, the term offshoring is also commonly used interchangeably with outsourcing. Offshoring has been defined as a practice where domestically supplied services are replaced by imported services (Bedzarnik 2005). To make the terms clear, the term IS outsourcing is used in this paper to address both IT and IS outsourcing concepts. Besides, terms such as a supplier, a vendor and a subcontractor are used to some extent interchangeably in the literature. In this paper, a subcontractor is used as a synonym for a vendor or a supplier.

Several studies have addressed the driving factors that seem to support outsourcing decisions in the companies. Another popular subject of studies has been undesirable consequences of IS outsourcing. A cross-section of relevant literature and some common concepts related to IS outsourcing are presented in table 1.

Table 1. A cross-section of relevant literature related to IS outsourcing.

Focus	Concept(s)	Author(s)
Driving factors related to IS outsourcing	Cost reduction, access to latest technologies and skills	Carmel (1999), Ketler & Willems (1999), Goo et al. (2000), Hersleb & Moitra (2001), Khan et al. (2003), Rottman (2006)
	Improved quality	Laplante et al. (2004)
	Solution to the IT skills shortage	Ketler & Willems (1999), Lacity & Willcocks (2001), Nicholson (2001), Khan et al. (2003), Amberg et al. (2005)
	Pressure to cut down costs	Matloff (2004)
	Reduction of debt	Smith et al. (1998)
Suppressing factors and undesirable consequences related to IS outsourcing	Difficulties in coordination and control	Carmel (1999), Ovaska et al. (2003)
	Hidden costs, transaction costs	Duncan (1998), Aubert et al. (1998), Khan et al. (2003), Overby (2003), Barthelemy (2003), Kobayashi-Hillary (2005)
	Cost savings are far from expected	Lacity & Hirschheim (1993), Smith et al. (1998), Senn & Gefen (1999), Barthelemy (2001), Lindholm & Suomala (2004), Matloff (2005)
	Quality problems	Matloff (2005)
	Language, cultural issues, trust, threat of vendor opportunism	Sabherwal (1999), Khan et al. (2003), Narayanaswamy & Henry (2005), Nguyen et al. (2006)
	Risks & risk mitigation	Lacity & Willcocks (2001), Taylor (2005), Gonzalez et al (2005), Aubert et al. (2005), Erickson & Evaristo (2006), Sakthivel (2007)

Several theoretical lenses have also been used to describe and interpret phenomena related to IS outsourcing. The Transaction Cost Economics (TCE) approach has been used to provide a view on risk management. The Resource-Based View (RBV) concentrates on value, accessibility and control of valuable resources – those resources that may affect the competitive advantage of the firm. Based on the literature study, these two approaches seem to be the most popular theories to explain how to avoid hazards in the IS outsourcing decision making. Also the Life Cycle Costing (LCC) and Total Cost of Ownership (TCO) theories have been used in several studies to evaluate the costs of IS outsourcing. The outsourcing research has been directed in recent years from the strategic and the economics views to a social view (Lee, Huynh, Chi-Wai and Pi 2000).

An extensive review of IS outsourcing literature and also the research approaches and theories used in IS outsourcing studies has also been presented by Dibbern et al. 2004. They report that the maturity of the IS outsourcing research is growing. Furthermore, when IS outsourcing as a research issue matures there will also be new subjects for research. The

study addresses, for example, partnerships, equity deals, offshoring and back-sourcing as the upcoming research issues. So, it seems that the IS outsourcing research might shift from analyzing the outsourcing decision process to analyzing relationship management and learning from experiences. The work of Dibbern et al. has been complemented by Sargent 2006. Sargent's analysis of the literature points out that the outsourcing relationship, as well as its attributes and processes, should be studied more carefully to be able to understand complex challenges related to it.

To summarize, numerous studies have been made on IS outsourcing. Some of them present its benefits and some of them present its drawbacks. Several studies also address the best practices and pitfalls of IS outsourcing supported with empirical evidence. The most recent research trend concentrates on the social aspects of IS outsourcing. Some relevant literature and common research topics addressed by them were presented in this short literature review.

### 3 Research Process

This research is done in cooperation with Lappeenranta University of Technology. Five researchers participated in the data collection and data analysis phases of the study. The study was conducted among six Finnish information systems development organizations starting in August 2006. Four of them were analyzed for this article. The research will last till the end of December 2007. In the beginning of the study, a framework of the contexts where information systems development organizations nowadays operate was created. In the beginning, also a few representatives of the case companies were interviewed to gather some basic information about the employees' own views on their company's targets of improvement related to their ISD practices. After these preliminary discussions with the companies the targets of improvement were gathered, analyzed and reflected to our framework. The targets of improvement that the interviewees mentioned were taken into account when the interview questions were designed.

The ultimate target of this research project is to provide more understanding about the linkage between organizational context and information systems development work. Fitzgerald, Russo and Stolterman 2002 define context as "both the place where the information system will be implemented and the environment within which the development process will take place". Based on these research objectives I focused on IS outsourcing. The objectives of this study were twofold. The first goal was to study the current state of the cooperation and IS outsourcing experiences in the case companies. The second goal was to evaluate the readiness to utilize IS outsourcing in the case companies. To be able to fulfill these objectives, I formulated my personal research question as follows:

*Q1: What are the driving factors and the suppressing factors related to information systems outsourcing in the case companies?*

The data for this qualitative study was collected using theme-based interviews. A total of 29 interviews were made in six Finnish information systems development companies between October and December 2006. The interviews lasted from 30 minutes to 3 hours, depending on the interviewee's role in the company. Employees acting in different roles, i.e. software analysts, project managers and line managers, were interviewed to provide a richer insight into the company's current ISD practices. The interviews were transcribed as text and analyzed with the grounded theory method (Strauss and Corbin 1990). Qualitative research requires the researcher's ability to interpret the interviewee's actions and verbal expressions. Furthermore, these interpretations have to be validated from the data and from the experiences of other researchers and practitioners (Klein and Myers 1999).

The analysis of the data was made in close cooperation with another researcher, so the interpretations were constantly validated so investigator triangulation was utilized (Denzin 1978).

The analysis started with an open coding phase, where each researcher had his own viewpoint on the data. My personal viewpoint was "The driving factors and the suppressing factors related to IS outsourcing". The open coding phase (Strauss and Corbin, 1990) was based on certain seed categories that in other words meant an interesting phenomenon related to the viewpoint I had selected. The original seed categories for my analysis were: change, collaboration competences, and context.

The open coding phase was followed by an axial coding phase, which in practice proceeded almost in parallel with the open coding phase. During the axial coding phase the observations were grouped to three different categories: cooperation and IS outsourcing experiences, driving factors related to IS outsourcing, and suppressing factors related to IS outsourcing. During the open coding and axial coding phases, theoretical sampling (Strauss and Corbin 1990) was utilized to guide further data collection. Two specific interviews were made to be able to build a better picture of the situation in the case companies.

The analysis was closed with a selective coding phase. In the selective coding phase the core of the results was formed, the analysis of the current situation related to IS outsourcing in the case companies was evaluated, and research reports were written.

## **4 Findings**

In this section the results of this study are presented. First, the four case companies analyzed for this paper are briefly introduced. After that the driving factors and the suppressing factors related to IS outsourcing in the case companies are reported. In the end of this section, the readiness to utilize IS outsourcing in the case companies is briefly evaluated based on the interview data. To avoid a loss of confidentiality among the companies the results are not presented in a case by case manner.

### **4.1 Introduction of the cases**

Company A is an internationally operating information systems development organization providing a number of products and services to its customers who come from several business domains. The forest industry division of this organization participated in this study. This organization has several international cooperation partners worldwide, and it has also utilized several subcontractors in its ISD projects for many years. Besides, the organization has carried out several distributed ISD projects in cooperation with its foreign agency.

Company B operates in the agricultural sector, providing several services to its customer. The company is currently owned by its customer. The company has several technological partnerships with international enterprises. At the moment, the company has no subcontractors in ISD projects. The company has experiences from utilizing both Finnish and foreign subcontractors in its ISD projects.

Company C is an internationally operating information systems development organization. It operates in the forest and saw industry sectors, providing a tailored product for enterprise resource planning. The company also executes tailored projects and acts as a consultant for its forest industry customers. The company has two remote offices in Finland with which they cooperate. The company has also three foreign agencies placed in Central Europe. Furthermore, the company has a lot of cooperation experience with its partners.

Company D provides information logistics services to its customer. The company operates mainly in Finland but it has also some ongoing projects in other European countries. At the moment the company is owned by its customer. The company co-operates with numerous companies, and it has utilized dozens of subcontractors. Some of the company's subcontractors have operated on-site in the company's premises.

### **4.2 The driving factors related to IS outsourcing**

The main driving factor related to IS outsourcing in the case companies was a strong pressure to cut down costs in ISD projects. This demand is presented by either the shareholders or the customers. In some cases a customer had demanded a company to utilize IS outsourcing to cut down ISD costs. Some expressions from the inter-views about the cost pressure are included here:

*"... Well I think that cost pressure is quite high and it seems that they are more cost effective than for example in Finland..."*

*"...customer demanded us to use the XXXXXXX. Later on they demanded to expand that and to transfer the maintenance there..."*

*"...I would say that of course two of the most definitely important points are the ways that increase their competitiveness. I mean in that sense that what are the financial limitations or requirements and so on. I mean price..."*

*"...We replace our own work with the work of subcontractors because it is cheaper. This is usually done already when the project plan is made..."*

*"...When I started working in this company five years ago, IT costs were approximately 8 percent of turnover. Now they are approximately 4 percent. So we have to produce the same services with lower costs..."*

Another strongly expressed driving factor was the company's need to utilize certain special technological competencies. The interviewees saw that these special competencies are more cost-effective to buy from a subcontractor than to produce them inside the company. Some comments from the interviews are included here:

*"...they are based on some competence. We know that certain people are competent in some special area..."*

*"...When we get a new project and if we know that we don't have a certain competence in-house, we have a network of consults and subcontractors that will help us by providing their specialists..."*

*"...There might be some kind of technology or something that is not reasonable for us to learn or study...or put our effort on it..."*

*"...There are certain competencies that are not reasonable for us to produce by ourselves. We buy them from subcontractors..."*

Both of these two factors were strongly expressed in the interviews. In addition, the companies are interested in utilizing subcontractors as a resource pool. In some case companies, the former positive experiences from IS outsourcing were mentioned as a driving factor for expanding IS outsourcing in the future. Some of the interviewees also saw IS outsourcing as a possibility for the company to concentrate on their own core competencies.

### **4.3 The suppressing factors related to IS outsourcing**

One of the main suppressing factors in utilizing IS outsourcing expressed by the interviewees was the language barrier. In most case companies the interviewees somehow expressed that their written and spoken English skills were not on the level required for operating with foreign subcontractors. They also expressed that at least most and in some cases all of the documentation of the ISD projects is written in Finnish. Some expressions from the interviews were as follows:

*"...We have the objective to use English as an official language in our organization, but it will take a long time. We have plenty of employees who are not able to communicate with the foreign language..."*

*"...If you were a representative of our management and you told me that we should use a subcontractor in a certain project... The first issue I would think of would be the language context. If I had XXXX pages of Finnish documentation and then ... would it be worthwhile to hire a foreign subcontractor..."*

*"...We had people here who couldn't speak English well and also the XXXXX staff had similar problems..."*

The lack of domain knowledge among foreign subcontractors was also expressed in several interviews in different companies. Here are two comments describing the situation:

*"...There are lots of offerers. There are probably also lots of competent employees, I suppose. Then, when we describe our business domain and tell about the domain knowledge requirements we have, the domain knowledge is not found..."*

*"There is not much domain knowledge. Then we should familiarize and educate them..."*

The ISD practices in the case companies include a lot of hidden knowledge. Interviewees saw that the ISD practices in their company have been formed in the course of time, and their customer-oriented way of operating would be very difficult to document in such a way that it would be reasonable to outsource parts of it. In three of the companies, the interviewees expressed some dissatisfaction with the way how the ISD practices in their company were organized. They felt that their ISD practices should be somehow developed to a more formal model before they would be able to utilize IS outsourcing.

There were also some other suppressing factors posed in the interviews. In one of the companies a rare technology is used, and the interviewees expressed that there have been no competent resources available for that technology. One of the companies has had contradictory experiences from its former IS outsourcing projects and the company is not interested in utilizing foreign subcontractors any more. Technically challenging environment was also mentioned in two of the case companies. They evaluated that an ISD project should last at least six months before it would be reasonable to utilize IS outsourcing. The summary of the finding in these four Finnish ISD organizations is presented in table 2.

Table 2. The factors related to IS outsourcing in the case companies.

Suppressing factors related to IS outsourcing	Driving factors related to IS outsourcing
Former contradictory experiences from IS outsourcing	Concentrating on core competencies
Documentation is done in Finnish	The access to a resource pool
Fear to outsource company's knowledge	Cost pressures
Language barrier	Former positive experiences from IS outsourcing
Subcontractors' lack of domain knowledge	Need for special competencies
Current state of the company's ISD practices	

#### 4.4 The evaluation of the readiness to utilize IS outsourcing

In most case companies the interviewees felt that their company's ISD practices are not formal enough for the use of IS outsourcing or, in some cases, for expanding it. The interviewees saw that before using foreign subcontractors, ISD practices inside their own company should be developed towards a more formal model.

Another topic that was mentioned in several interviews was the real benefit gained from IS outsourcing. Several interviewees in different companies felt that IS outsourcing produced a new group of different cost factors. Based on the interviews these cost factors have been identified, but they have not, however, been exactly calculated or analyzed. According to the interviews the total costs of the outsourced projects are not yet known. Some comments expressed in the interviews were as follows:

*"...There were lots of problems and it wasn't cheaper at all. Lots of hours were spent and it was hard to even get any results..."*

*"...To summarize, it was good that programs worked, it could have been even worse if they had not worked at all. After all, it was probably not any cheaper, and the total cost of the maintenance has sure been bigger..."*

Table 3 summarizes the four case companies and presents their current experiences related to IS outsourcing. The evaluation of the readiness to utilize IS out-sourcing in the case companies based on the analysis is also presented.

Table 3. Summary of the case companies.

	Context / Customer domain	Type of current cooperation and IS outsourcing experiences	Evaluation of company's readiness to outsource
<b>Company A</b>	Forest industry	Special areas of technology, user interface of software project, partnering	Contradictory (somehow ready, somehow not ready)
<b>Company B</b>	Agriculture	Some software development projects	Not ready
<b>Company C</b>	Forest industry	Special areas of technology, cooperation in process interfaces	Not ready
<b>Company D</b>	Information logistics	Special areas of technology, software development outsourcing, partnering	Mostly ready

## 5 Discussion

The companies participating in this study came from three different customer do-mains. All of these case companies have some experiences from IS outsourcing or other types of relationships with other organizations in ISD. Based on the empirical evidence collected during this study, it is justified to argue that IS outsourcing is in practice much more complex to implement than a management of an organization presumes. Furthermore, it seems that IS outsourcing decisions have been mostly based on cost-related issues. However, there were no expressions in the interviews about evaluation of the costs that IS outsourcing causes.

There is naturally a number of limitations in this study. Only four ISD companies are analyzed for this study, so the results cannot be generalized to a wider context. Besides, a deep analysis about the IS outsourcing decision process and different cost factors related to it was not performed in this study. During the analysis, theoretical sampling was used to guide data collection, but timetables and resources forced to limit the number of detailed interviews. When you use theoretical sampling, you should have a lot of time and resources to make interviews, transcribe and analyze them, and maybe take another round if it is necessary. Unfortunately, you probably do not have that much time and resources in a normal research project. In my opinion this is a significant weakness in the grounded theory method – it takes a lot of time and resources.

However, the results of this study support the previous studies made about IS outsourcing and reveals that the driving factors and the suppressing factors related to IS outsourcing reported in different contexts are mostly the same in this context as in the previously studied contexts. A deeper analysis of the total costs of certain out-sourced ISD projects would be an interesting topic to explore in the future studies, and it certainly should be addressed.

Finland is an interesting case for this kind of study, because Finland has in recent years done extremely well in Global Competitiveness reports. The results of this study implicate that although Finland is a highly competitive nation, there are still a number of challenges in utilizing outsourcing in ISD. It could be useful for other nations to benchmark how these challenges are dealt with in Finnish ISD organizations.

## **6 Summary**

This study was a part of a larger, ongoing research project that investigates different contexts of information systems development organizations. This paper focused on describing results of the current situation related to IS outsourcing practices in four Finnish ISD organizations. The analysis provided a group of driving factors and suppressing factors related to IS outsourcing in the case companies. Besides, the case companies' readiness to utilize IS outsourcing was briefly evaluated. The main driving factors were the demand for cost-effectiveness, the utilization of special technological competencies, and the possibility to access a pool or resources. The main suppressing factors were the language barrier, the lack of domain knowledge among subcontractors, and the challenging technological environment in the case companies.

Based on the results of this study, it was possible to answer the question 'what are the driving and the suppressing factors related to IS outsourcing in the case companies'. However, it was not been possible to present how the outsourced ISD projects actually performed in the case companies. Therefore, more research is needed to analyze the situation more widely and on a more detailed level.

## References

- Amberg, M., Herold, G., Kodes, R., Kraus, R. & Wiener, M. (2005) IT offshoring – A cost-oriented analysis. *Manuscript for the CISTM, 2005*.
- Aubert, B., Patry, M. and Rivard, S. (1998). Assessing the Risk of IT Outsourcing. *Proceedings of the 31st Annual Hawaii Conference on System Sciences*.
- Aubert, B., Patry, M. & Rivard S. (2005). A Framework for Information Technology Out-sourcing Risk Management. *The Data Base of Advances in Information Systems – Fall 2005, Vol. 36, No. 4*.
- Bedzarnik, R. (2005). Restructuring Information Technology: Is Offshoring a concern? *Monthly Labor Review, August 2005*.
- Barthelemy, J. (2001) The hidden costs of IT outsourcing. *MIT Sloan management review – Spring 2001*.
- Berthelemy, J. (2003). *The Seven deadly sins of outsourcing*. Academy of Management Executive, 2003, Vol. 17, No. 2.
- Carmel, E. (1999) *Global Software Teams*. Prentice Hall 1999. ISBN 0-13-924218-X.
- Denzin, N. (1978). *The Research act: A theoretical introduction to sociological methods*. McGraw-Hill.
- Dibbern, G., Goeles, H., Hirschheim & Jayatilaka (2004). Information Systems Outsourcing: A Survey and Analysis of the Literature. *The DATABASE for Advances in Information Systems, Fall 2004, Vol. 35, No.4*.
- Duncan, N. (1998). Beyond opportunism: A Resource based view of Outsourcing risk. *Proceedings of the 31st Annual Hawaii International Conference on System Sciences*.
- Elmuti, D. and Kathawala, Y. (2000). The effects of global outsourcing strategies on participants' attitudes and organizational effectiveness. *International Journal of Manpower, Vol 21, No. 2, pp. 112-128*.
- Erickson, J. & Evaristo, R. (2006). Risk Factors in Distributed Projects. *Proceedings of the 39th Hawaii International Conference on System Sciences – 2006*.
- Fitzgerald B., Russo, N. L. & Stolterman E. (2002). *Information Systems Development: Methods in Action*. McGraw-Hill Education. ISBN: 007709836 6.
- Gilley, K.M. & Rasheed, A. (2000). Making more by doing less: An analysis of outsourcing and its effects on firm performance. *Journal of Management, Vol 26, No 4, pp. 763-790*.
- Gonzalez R., Gasco, J. & Llopis, J. (2005). Information Systems outsourcing Risks: A study of large firms. *Industrial management & Data systems, Vol. 105, No. 1 2005*.
- Goo, J., Kishore, R. & Rao, H. R. (2000). A content-analytic longitudinal study of the drivers for information technology and systems outsourcing. *Proceedings of the 21st international conference on information systems (ICIS'00), December 2000*.
- Hersleb, J. & Moitra, D. (2001). Global Software Development. *IEEE Software March / April 2001*.
- Kakabadse, A. & Kakabadse, N. (2002). Trends in Outsourcing: Contrasting USA and Europe. *European Management Journal Vol 20, No. 2, pp. 189-198, April 2002*.
- Ketler, K. & Willems, J.R. (1999). A study of the outsourcing decision: Preliminary results. SIGCPR'99, New Orleans LA, USA.
- Khan, N., Currie, W., Weerakkody, V. & Desai B. (2003). Evaluating Offshore IT Outsourcing in India: Supplier and Customer Scenarios. *Proceedings of the 36th Hawaii International Conference on Systems Sciences (HICSS'03)*.
- Klein, H. K. & Myers, M. D. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly, Vol 23, No 1, pp. 67-94*.
- Kobayashi-Hillary, M. (2005). A Passage to India. Pitfalls that the outsourcing vendor forgot to mention. *QUEUE, Feb 2005*.
- Lacity, M.C and Hirschheim, R. (1993). Information Systems Outsourcing: Myths, Metaphors and realities. *Wiley series in Information systems*.
- Lacity, M. & Willcocks, L. P. (2001). Global Information Technology Outsourcing: In search of Business Advantage. *John Wiley & Sons, LTD, 2001*.
- Laplante, P., Costello, T., Singh, P., Bindiganavile, S. & Landon, M. (2004). The Who, What, Why, Where, and When of IT Outsourcing. *IEEE Computer Society, January-February 2004, IT Pro*.
- Lee, J., Huynh, M., Chi-Wai, K. & Pi, S. (2000). The evolution of Outsourcing Research: What is the next issue?. *Proceeding of the 33rd Hawaii International Conference on System Sciences 2000*.
- Lee, J. Outsourcing reference list. Available in html format in: [http://www.is.cityu.edu.hk/staff/isjnlee/out\\_frame\\_tot.htm](http://www.is.cityu.edu.hk/staff/isjnlee/out_frame_tot.htm).
- Lindholm, A. & Suomala, P. (2004). The Possibilities of Life Cycle Costing in Outsourcing Decision making. *Frontiers of e-business research 2004*.
- Marcus, A. (2004). Insights on Outsourcing – What's in it for us? For Them? Where are we headed? *Interactions July + August 2004*.
- Matloff, N. (2004). Globalization and the American IT worker. *Communications of the ACM, November 2004, Vol. 47, No. 11*.
- Matloff, N. (2005). Offshoring: What can go wrong? *IT Pro July – August 2005*.
- Narayananaswamy, R. & Henry, R. (2005) Effects of Culture on Control Mechanisms in Off-shore Outsourced IT Projects. *SIGMIS'05, April 14-16, 2005, Atlanta, Georgia, USA*.
- Nguyen, P., Babar, M. & Verner, J. (2006). Critical Factors in Establishing and maintaining trust in Software outsourcing relationships. *ICSE'06 May 20-28, 2006, Shanghai, China*.
- Nicholson, B. (2001). Global Software Outsourcing: The solution to the IT skills gap. School of Accounting and Finance. *Workshop Report, 16 July 2001, Manchester school of Accounting and Finance, University of Manchester UK*.
- Ovaska, P., Rossi, M. and Marttiin, P. (2003) Architecture as a coordination tool in multi-site software development. *Software Process Vol 8, No 4, pp. 233-247*.
- Overby, S. (2003). *The Hidden Costs of Offshore Outsourcing – Offshore Outsourcing The Money*. Available in http format in <http://www.cio.com/article/29654>, September 1, 2003.
- Rottman, J. (2006). Successfully Outsourcing Embedded Software Development. *IEEE Computer society, January 2006*.
- Sabherwal, R. (1999). The Role of Trust in Outsourced IS Development Projects. *Communications of the ACM, Feb 1999, Vol. 42 No. 2*.
- Sakhivel, S. (2007). Managing Risk in Offshore Systems Development. *Communications of the ACM, April 2007, Vol. 50. No. 4*.



- Sargent, A. Jr. (2006). Outsourcing Relationship Literature: An examination and implications for future research. *SIGMIS-CPR'06, April 13-15, 2006, Claremont, California, USA.*
- Senn, J. A. & Gefen, D. (1999). The Relation Between Outsourcing and the Return from Corporate IT Spending: Perceptions from Practitioners. *Proceedings of the 32nd Hawaii International Conference on System Sciences (1999).*
- Smith, M. A., Mitra, S. & Narasimhan, S. Information systems outsourcing: A Study of Pre-Event Firm Characteristics. *Journal of Information Systems, Fall 1998, Vol. 15, No. 2, pp. 61-93.*
- Strauss, A. & Corbin, J. Basics of Qualitative Research, Techniques and Procedures for Developing Grounded Theory, second edition. *Sage Publications 1990.*
- Swink, M. (1999). Threats to new product manufacturability and the effects of development team integration processes. *Journal of Operations Management. No 17, pp. 691-709.*
- Taylor, H. (2005). The Move to Outsourced IT Projects: Key Risks from the Provider Perspective, *SIGMIS-CPR'05 April 14-16, 2005, Atlanta, Georgia, USA.*
- Willcocks, L.P. & Kern T. (1998). IT outsourcing as strategic partnering: The case of the UK inland Revenue. *European Journal of Information Systems, Vol. 7, No.1, pp. 29-45.*



## ACTA UNIVERSITATIS LAPPEENRANTAENSIS

- 564. AUVINEN, SAMI. Computational modeling of the properties of TiO<sub>2</sub> nanoparticles. 2013. Diss.
- 565. RAHIALA, SIRPA. Particle model for simulating limestone reactions in novel fluidised bed energy applications. 2013. Diss.
- 566. VIHOLAINEN, JUHA. Energy-efficient control strategies for variable speed controlled parallel pumping systems based on pump operation point monitoring with frequency converters. 2014. Diss.
- 567. VÄISÄNEN, SANNI. Greenhouse gas emissions from peat and biomass-derived fuels, electricity and heat – Estimation of various production chains by using LCA methodology. 2014. Diss.
- 568. SEMYONOV, DENIS. Computational studies for the design of process equipment with complex geometries. 2014. Diss.
- 569. KARPPINEN, HENRI. Reframing the relationship between service design and operations: a service engineering approach. 2014. Diss.
- 570. KALLIO, SAMULI. Modeling and parameter estimation of double-star permanent magnet synchronous machines. 2014. Diss.
- 571. SALMELA, ERNO. Kysyntä-toimitusketjun synkronointi epävarman kysynnän ja tarjonnan toimintaympäristössä. 2014. Diss.
- 572. RIUNGU-KALLIOSAARI, LEAH. Empirical study on the adoption, use and effects of cloud-based testing. 2014. Diss.
- 573. KINNARINEN, TEEMU. Pressure filtration characteristics of enzymatically hydrolyzed biomass suspensions. 2014. Diss.
- 574. LAMMASSAARI, TIMO. Muutos kuntaorganisaatiossa – tapaustutkimus erään kunnan teknisestä toimialasta. 2014. Diss.
- 575. KALWAR, SANTOSH KUMAR. Conceptualizing and measuring human anxiety on the Internet. 2014. Diss.
- 576. LANKINEN, JUKKA. Local features in image and video processing – object class matching and video shot detection. 2014. Diss.
- 577. AL-SAEDI, MAZIN. Flexible multibody dynamics and intelligent control of a hydraulically driven hybrid redundant robot machine. 2014. Diss.
- 578. TYSTER, JUHO. Power semiconductor nonlinearities in active  $du/dt$  output filtering. 2014. Diss.
- 579. KERÄNEN, JOONA. Customer value assessment in business markets. 2014. Diss.
- 580. ALEXANDROVA, YULIA. Wind turbine direct-drive permanent-magnet generator with direct liquid cooling for mass reduction. 2014. Diss.
- 581. HUHTALA, MERJA. PDM system functions and utilizations analysis to improve the efficiency of sheet metal product design and manufacturing. 2014. Diss.
- 582. SAUNILA, MINNA. Performance management through innovation capability in SMEs. 2014. Diss.
- 583. LANA, ANDREY. LVDC power distribution system: computational modelling. 2014. Diss.
- 584. PEKKARINEN, JOONAS. Laser cladding with scanning optics. 2014. Diss.

585. PELTOMAA, JYRKI. The early activities of front end of innovation in OEM companies using a new FEI platform as a framework for renewal. 2014. Diss.
586. ROZHANSKY, IGOR. Resonant tunneling effects in semiconductor heterostructures. 2014. Diss.
587. PHAM, THUY DUONG. Ultrasonic and electrokinetic remediation of low permeability soil contaminated with persistent organic pollutants. 2014. Diss.
588. HOKKANEN, SANNA. Modified nano- and microcellulose based adsorption materials in water treatment. 2014. Diss.
589. HINKKANEN, JUHA. Cooperative strategy in emerging markets – analysis of interfirm R&D cooperation and performance in Russian manufacturing companies. 2014. Diss.
590. RUSKOVAARA, ELENA. Entrepreneurship education in basic and upper secondary education – measurement and empirical evidence. 2014. Diss.
591. IKÄHEIMONEN, TUULI. The board of directors as a part of family business governance – multilevel participation and board development. 2014. Diss.
592. HAJIALI, ZUNED. Computational modeling of stented coronary arteries. 2014. Diss.
593. UUSITALO, VILLE. Potential for greenhouse gas emission reductions by using biomethane as road transportation fuel. 2014. Diss.
594. HAVUKAINEN, JOUNI. Biogas production in regional biodegradable waste treatment – possibilities for improving energy performance and reducing GHG emissions. 2014. Diss.
595. HEIKKINEN, JANNE. Vibrations in rotating machinery arising from minor imperfections in component geometries. 2014. Diss.
596. GHALAMCHI, BEHNAM. Dynamic analysis model of spherical roller bearings with defects. 2014. Diss.
597. POLIKARPOVA, MARIIA. Liquid cooling solutions for rotating permanent magnet synchronous machines. 2014. Diss.
598. CHAUDHARI, ASHVINKUMAR. Large-eddy simulation of wind flows over complex terrains for wind energy applications. 2014. Diss.
599. PURHONEN, MIKKO. Minimizing circulating current in parallel-connected photovoltaic inverters. 2014. Diss.
600. SAUKKONEN, ESA. Effects of the partial removal of wood hemicelluloses on the properties of kraft pulp. 2014. Diss.
601. GUDARZI, DAVOOD. Catalytic direct synthesis of hydrogen peroxide in a novel microstructured reactor. 2014. Diss.
602. VALKEAPÄÄ, ANTTI. Development of finite elements for analysis of biomechanical structures using flexible multibody formulations. 2014. Diss.
603. SSEBUGERE, PATRICK. Persistent organic pollutants in sediments and fish from Lake Victoria, East Africa. 2014. Diss.
604. STOKLASA, JAN. Linguistic models for decision support. 2014. Diss.
605. VEPSÄLÄINEN, ARI. Heterogenous mass transfer in fluidized beds by computational fluid dynamics. 2014. Diss.

