DUKUZUMUREMYI, SALVADOR
THE USE OF TECHNOLOGY TO PROMOTE COLLABORATIVE LEARNING IN INCLUSIVE EDUCATION IN PRIMARY SCHOOL

Master's Thesis in Education
FACULTY OF EDUCATION
Master’s Degree Programme in Learning, Education and Technology
2014
This study investigated the utilization of Computer Supported Collaborative Learning (CSCL) software and applications and its associated theories of learning and pedagogical models into inclusive classroom as well as conception of knowledge of diverse pupils in collaborative learning groups.

A second grade class of a primary school in the northern Finland is used as a case of study. There are a total number of 23 participants for data triangulation; these include 21 pupils, one teacher and her assistant. The groups of 2 to 6 pupils were formed in five different computer science lessons. The principal data were collected through observation, however interview, questionnaire, documentation were also part of the data collection, which made it a methodological triangulation. The data were analysed using thematic analysis, content analysis and percentage analysis.

The data showed that the use of CSCL software and applications with its various scaffolding icons in inclusive classroom of diverse pupils, has helped the pupils in developing good reading, writing, and information assessment skills, as well as discovery of new ideas, hence motivates and makes learning easier.

The data suggested that the CSCL software and applications are a resourceful way of learning social skills because the group members share one laptop, to cooperatively a group task done. From these findings one can tentatively argue that the creation of pedagogical environment, which involves application of various pedagogical strategies like changing the seating arrangements, regrouping the pupils, as well as changing teaching methodologies; has greatly helped pupils to be more creative and think critically. The data also suggested that the results for the given tasks were relatively the same for all the groups, irrespective of the participating group members learning abilities.

One can claim that the implication of the use of collaborative learning groups of diverse pupils assisted by CSCL should focus basically on how to promote trialogical activities, interactions of pupils to pupils, pupils to teachers and pupils to learning materials & ICT tools and scaffoldings.

**Asiasanat/Keywords** Collaborative learning, dialogical, diversity of pupils, inclusive education, ICT based learning, social constructivism
# TABLE OF CONTENTS

1  INTRODUCTION ............................................................................................................................ 1

2  THEORETICAL FRAMEWORK ................................................................................................... 4

   2.1  Collaborative learning ............................................................................................................... 5

       2.1.1  Group members’ interaction.......................................................................................... 7

       2.1.2  Learning in group ......................................................................................................... 9

       2.1.3  Similarities between cooperation and collaboration ..................................................... 11

       2.1.4  Criticism in cooperation and collaboration .................................................................. 11

   2.2  ICT based learning ................................................................................................................... 12

       2.2.1  The Computer Supported Collaborative Learning (CSCL) systems ............................ 15

       2.2.2  Social constructivist approach ..................................................................................... 16

       2.2.3  Dialogical approach .................................................................................................... 17

   2.3  Inclusive education .................................................................................................................. 19

       2.3.1  Inclusion in classroom and learning approaches ........................................................ 21

       2.3.2  Inclusion and technology enhanced learning (TEL) .................................................... 22

       2.3.3  Summary of theoretical framework .............................................................................. 24

3  METHODS ..................................................................................................................................... 25

   3.1  Aim and research questions .................................................................................................... 25

   3.2  Participants, context and research design ............................................................................... 25

       3.2.1  Participants .................................................................................................................. 25

       3.2.2  Procedures ................................................................................................................... 25

       3.2.3  Methodology ................................................................................................................. 27

   3.3  Data collection ........................................................................................................................ 28

       3.3.1  Questionnaire ................................................................................................................. 29

       3.3.2  Direct class observation ................................................................................................ 30

       3.3.3  Interviews ...................................................................................................................... 32

       3.3.4  Documentation .............................................................................................................. 33

   3.4  Data analysis .......................................................................................................................... 33

       3.4.1  Content analysis and thematic analysis ....................................................................... 33

       3.4.2  Statistical techniques (Percentage analysis) ................................................................. 34

4  RESULTS ....................................................................................................................................... 36

   4.1  What is the role of technology in supporting the pupils’ collaboration? ............................ 36

   4.2  How does the CSCL function within diverse primary pupils? ........................................... 37

       4.2.1  Learning products (pupils products) and product (teacher’s evaluation and criteria) .... 38

       4.2.2  Pupils’ and classroom resources’ arrangements, and their choice and use. ............... 44

       4.2.3  The styles of learning for young pupils ....................................................................... 47

5  SUMMARY OF FINDINGS ........................................................................................................... 53
6 DISCUSSION AND CONCLUSION ........................................................................................................ 56
   6.1 Implication .......................................................................................................................... 60
   6.2 Limitations ......................................................................................................................... 60
   6.3 Suggestion for further research ......................................................................................... 61

7 EVALUATION ............................................................................................................................. 62
   7.1 Reliability and validity ....................................................................................................... 62
   7.2 Ethical evaluation .............................................................................................................. 62

REFERENCES ......................................................................................................................................... 65

Appendix 1 .............................................................................................................................................. 3

Appendix 2 .............................................................................................................................................. 2
1 INTRODUCTION

Nowadays every school is looking how it starts and maintains the education founded on equality and gives access to all children. Within this context, the new theories of learning and pedagogical models have been introduced in different schools. “Innovative learning environments” have been created to support the learning (OECD, 2008; Sirkkola, 2010). The use of “different senses” to ensure better communication between teachers, pupils and pupils to teachers has also been taken into consideration in learning. The education promoted in today's schools is known as inclusive education (OECD, 2008).

Inclusive education is recognized by Underwood (2012) as “education based on the principles of acceptance and inclusion of all pupils”. As Carrington and Holm (2005) and Kugelmass (2004) inclusion “refers to the placement of students with disabilities in ordinary classrooms alongside their peers” In inclusion, pupils with special education needs study together with non-disabled pupils and engage in ordinary classroom activities equal with their classmates (Bates, Morris, & Davis, 2003; Carrington & Holm, 2005; Kugelmass, 2004).

The idea of educational equality to all children is the main key to many schools around the world. Many schools are testing learning theories and pedagogical models which can fit their vision, mission and aims. Primary School of Northern Finland has the same idea of having better education. It started collaborative learning in order to enrich the quality of education which is currently based on learning alone. According to Istifci and Kaya (2011) “collaboration requires cooperation”. “In cooperation, members of group spilt the work, solve sub-tasks individually and then assemble the partial results into the final output while in collaboration, members of group do the work together”(Dillenbourg, 1999).

In this view the present thesis wants to find out how collaborative learning mediated via technology works. How is it implemented in classrooms, where the pairs or small groups of pupils with and without special education needs do the tasks on computers either in computer based task environment or in computer mediated collaborative environment. The aim is to have a better conception of knowledge. In order words, this research studies how pupils function in a group in inclusive classroom, how pupils with disabilities participate in collaborative learning mediated via computers, how teachers facilitate and guide this teaching and learning as well as interactions between pupils to pupils, pupils to teachers and
pupils to contents. In general, this type of teaching and learning allows pupils to work, discuss and dialogue with each other anytime and anywhere as well as interact and collaborate with their teachers and peers whenever and wherever. Nevertheless, Head (2003) concluded that effective collaboration can be viewed as a group of people behaving in a way that not only produces individual benefits, but leads to a degree of success belonging to the group and can only be achieved by group members working together in the fashion.

According to the UNESCO (2009) education has to accommodate all children, youth, and adults with disabilities. César and Santos (2006) argued that education must admit all children in schools and classrooms regardless of their characteristics. United Nations (2001) declared to protect the rights of people with disabilities and to promote their full participation and equality in education, job and national development process while EURYDICE (2009/2010) declared that all children have a right to go to the school nearby to their home and receive the special support they need.

The primary school in this case study is admitting all children regardless of disabilities and personal characteristics and all pupils are placed in regular class. In an on-going project entitled COLLABORATIVE LEARNING, pupils learn together in groups of 2 to 4, do tasks together and share the same goals by using the principles of cooperation and collaboration. Primary school supports inclusive education which means that the members of the pairs or small groups are formulated without any restrictions. Some of the group members have special education needs and some do not have. In this research I looked how collaborative learning helps the pupils to construct shared knowledge rather than forced knowledge.

Research studies (Dillenbourg, 1999; Head, 2003; Istifci & Kaya, 2011; Resta & Laferrière, 2007) have found that collaborative learning help pupils to combine different skills and exchange arguments, and work in small groups that help each other to learn better and to fulfil common aims than learning individually. The aims of working collaboratively or cooperatively are to stimulate active participation and success of peers, construct knowledge and coach each other to reach learning objectives. Teachers act as moderators, counsellors, helpers, assistants, facilitators, guides and supporters of the learning process. Pupils and teachers create environments that allow pupils to learn in democracy and harmony.
In addition to collaborative teaching and learning, Fillion and Booto Ekionea (2012) revealed that the introduction of Information Communication and Technology (ICT) in education has transformed the ways teachers teach and pupils learn. The use of computers and the Internet have changed traditional methods of teaching and learning (Buzzi, Buzzi, Leporini, & Mori, 2012). Fillion and Booto Ekionea (2012) ask the best pedagogy to use in teaching. Furthermore, Bennett, Maton, and Kervin (2008); Jones(2012); Kirschner and Karpinski (2010) and Margaryan, Littlejohn, and Vojt (2011) noticed that newborns since 1980 are known as the “Digital Natives” or “Millenial” or “Net Generation” or “Homo Zappiens” because of their familiarity with and reliance on ICT and that they are good at using computers, video games, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. Primary School already has the physical learning environment and sufficient ICT facilities needed to support new teaching methods.
2 THEORETICAL FRAMEWORK

This work is based on three theoretical concepts named collaborative learning, ICT based learning and inclusion in education (see figure 1).

![Diagram showing the relationship between ICT based learning, Collaborative learning, and Inclusive in education.]

Those three theories were chosen because the services of one need the services of others in their implementation into inclusive classroom. According to Kobbe et al. (2007) Collaborative Learning depict how to form groups, participation in dialogue, cognitive conflict management, goals setting, timing, assistance, and performing activities, solving the problem and selecting technology allowing collaboration. In other words, in classroom context collaborative learning deals with how to form groups and rules to work in group to enable pupils to achieve their joint goals.

ICT based learning deals with support such as resources (e.g. hardware; software; educational software, applications and programs), prompts, and also offer pedagogy to these resources to assist the group of pupils in understanding learning materials and doing academic tasks.

Inclusion in education deals with diversity of pupils and different methodology in teaching them. In addition, inclusive learning is a study of diversity of pupils by selecting fitting pedagogy and technology to teach them.
2.1 Collaborative learning

Several researchers have attempted to define collaborative learning. Fischer, Kollar, Mandl, and Haake (2007) defined collaborative learning as learning in small groups where groups act relatively independent of teacher with the goals of acquiring knowledge or skills, supporting social interaction and encouraging the pupil’s cognitive process. Resta and Laferrière (2007) defined “collaborative learning as learning process where two or more people work together to create meaning, explores a topic, or improve skills”. Istifci and Kaya (2011) defined “collaborative learning as a process in which pupils work in small groups and help each other to learn”. Furthermore, Istifci and Kaya (2011) found many roles of collaborative learning among collaborators such as to create a positive social atmosphere, work collaboratively with group objective, facilitate perception, teach each other in order to reach learning objectives and to fulfil group objective.

In their studies related to collaborative learning (Fischer et al., 2007; Istifci & Kaya, 2011; Resta & Laferrière, 2007) have proved that the foundation of collaborative learning is learning in small groups with goals of groups. Istifci and Kaya (2011) and Head (2003) revealed that collaborative learning requires cooperation, collaboration, coordination, consultation, communication, solidarity and reciprocal loyalty, mutual and positive commitment towards the active participation, common goals, contribution of each group member to the success of the group and establish better friendship in group works.

Current research (Ludvigsen & Mørch, 2010) found the closest link between the collaborative learning, scaffolding, CSCL and mediating artifact. According to Resta and Laferrière (2007), successful collaboration requires learning environment to provide support to the group interaction, effective construction of knowledge and the provision of scaffolding, leadership, and the teacher’s assistance.

Ludvigsen and Mørch (2010); Myhill, Jones, and Hopper (2005) and Sawyer (2006) found scaffolding as an instructional method (prompts, hints) whereby pupils are helped by teacher or peer in collaborative learning; modelled new skills and understanding that are tailored to that pupils’ needs in achieving goals of the moment and then pupils continue responsibilities. The CSCL is the field of technology enhanced learning concerned with how ICT might support learning in groups or collaborative
learning. The CSCL is built with features that perform scaffolding. This involves that CSCL first of all is a mediating and enhancing artefact (Ludvigsen & Mørch, 2010).

Dillenbourg’s contributions in learning focused on learning something together in pairs or dyads, triads, small groups, larger groups or more people when co-workers have common goals (Dillenbourg, Baker, Blaye, & O'Malley, 1995; Dillenbourg, 1999; Dillenbourg, 2002).

Dillenbourg (1999) has described some size group where a pair was defined as two people, a small group was defined as three to five people, a class was defined as twenty to thirty people, a community was defined as a few hundreds or thousands of people, a society was defined as several thousands or millions of people, etc. As to Johnson (1991) and Johnson and Johnson (1996), larger groups and more people like class, community, a society, should be divided into small groups for ensuring good cooperation and collaboration.

The size of group, age and gender and heterogeneity of members, nature of task, communication media, knowledge and skills, domain expertise are the variables considered in forming groups (Dillenbourg et al., 1995; Dillenbourg, 2002; Kreijns, Kirschner, & Jochems, 2003).

Findings (Dillenbourg et al., 1995; Dillenbourg, 2002; Kreijns et al., 2003) didn’t talk much about diversity of pupils and suitability of tools and resources. The findings of study of Vygotsky (1980) related to zone of proximal development (ZPD) was exerted in the researches of Dillenbourg et al. (1995). The ZPD focused on assistance given to the group of pupils solving problem together (Dillenbourg et al., 1995). Woo and Reeves (2007) explained ZPD as one of the concepts of social constructivism, which emphasizes on construction of knowledge by means of mediation and negation. According to Woo and Reeves(2007), the ZPD is an approach used by the pupils to construct their own meaning, share what they are thinking, collaborate with their peers, incorporate diverse perspectives of others such as peers, teachers, experts in order to accomplish a task. Head (2003) comprehended ZPD as equally as scaffolding in collaborative learning. Vygotsky (1980) saw ZPD as a learning model that helps young pupils to become active and achieve better performance in group tasks that lead them to develop their individual knowledge in the time they are repeating the same tasks. This description leads me to inclusive education discussed in the section 2.3 of this research.
The collaborative learning theory was chosen in this research because the results of researches (Van Boxtel, Van der Linden, & Kanselaar, 2000; Wang, 2014) have shown that collaborative learning supports social interaction that stimulates elaboration of conceptual knowledge and development of pupils’ ability and willingness to offer and receive feedback. They showed also that collaborative learning allowed the pupils to develop confidence in giving and receiving constructive comments. Collaborative learning increases the pupils’ motivation to learn from others, to discuss ideas, to negotiate meaning, to engage in activities such as verbalization of their understanding of the concepts, talking to someone else, asking and answering of questions, sharing and distributing of knowledge and expertise among a group of pupils.

2.1.1 Group members’ interaction

Woo and Reeves (2007, p.16) referred to interaction as “a dialogue or discourse or event between two or more participants and objects which occurs synchronously and/or asynchronously mediated by response or feedback and interfaced by technology”

Interaction among group members in school classes can be recapitulated in three approaches such as “competitively”, “individualistically”, and “collaboratively” (Johnson, 1991, p. 21). This research deals with only the last approach known as collaboration.

Puntambekar (2006) discussed three dimensions of collaborative interactions, these including (a) divergence of ideas (pupils are encouraged to raise new topics, ask questions, respond to each other’s contributions, take charge of their own learning, lead discussions, offer new perspectives, and learn in a dynamic social environment), (b) collaborative knowledge building (taking into account each other’s perspectives in a social learning situation) and (c) construction (pupils’ abilities to construct their own understanding and apply what they had learned in their discussions with the teacher and their peers). Puntambekar (2006) found out three factors that have effect on pupils’ interaction such as (a) nature of the problem i.e., type of problem that was presented to the students, (b) student perceptions i.e. pupils’ perceptions of what they needed in a course and (c) nature of the tool i.e. scaffolds and affordance of a tool for discussion and facilitation of processes.

In similar way, Soo and Bonk (1998) found that the interaction regarded the nature of the subject matter, the maturity of pupils, and the media used in the course
In collaboration, the main target of all members is to accomplish shared goals and outcomes. They work together hand in hand in order to maximize the potentiality of each member in group. The success of each member becomes benefits and success of others (Johnson, 1991)

There is an indication of six nature of interactions: pupil-material interaction, pupil-self interaction, pupil-pupil(s) interaction, pupil-teacher interaction, pupil-interface interaction and vicarious interaction (Soo & Bonk, 1998; Woo & Reeves, 2007), twelve categories of interactions: synchronous pupil-material interaction; synchronous pupil-self (reflective) interaction; synchronous pupil-pupil(s) interaction; synchronous teacher-pupil interaction; synchronous pupil-interface interaction; synchronous vicarious interaction; asynchronous pupil-material interaction; asynchronous pupil-self(reflective) interaction; asynchronous pupil-pupil(s) interaction; and asynchronous teacher-pupil interaction; asynchronous pupil-interface interaction, asynchronous vicarious interaction(Soo & Bonk, 1998), and five interaction purposes: to interact with content, to collaborate, to converse, to help monitor and regulate learning and to support performance (Woo & Reeves, 2007)

Four nature of interaction was defined by Soo and Bonk (1998) as following:

1. **Pupil-self interaction** “refers to the learner's reflections on the content, learning process and his new understanding” (p.3).

2. **Pupil-pupil interaction** “refers to the interaction between one pupil and other pupils, whether alone or in group settings, with or without the real-time presence of a teacher” (p.3).

3. **Pupil-teacher interaction** “refers to the assistance, counsel, organization, stimulation and support that the teacher provides to the pupil in helping the latter construct new understanding of the content” (p.3).

4. **Pupil-material interaction** “is the interaction the pupil has with the subject matter. Interaction between learners and content refers to learners constructing knowledge through a process of accommodating new understanding into their cognitive structures” (p. 3).

Definitions of two nature of interaction were cited in Woo and Reeves (2007) as following:
5. *Vicarious interaction* is the interaction which takes place when a pupil actively observes and processes both sides of a direct interaction between two other pupils or between another pupil and the teacher *(p. 16)*

6. *Pupil-interface interaction* “is interaction mediated via a medium in technology-based learning situations” *(p. 16)*

The group should have a set of strategies to guide them to achieve the goals and outcomes. The set of those strategies was known as “Collaboration scripts” by (Dillenbourg & Jer-mann, 2007; Fischer et al., 2007; Harrer, Kobbe, & Malzahn, 2007; Kobbe et al., 2007; Kollar, Fischer, & Hesse, 2006; Kollar, Fischer, & Slotta, 2007; Tsovaltzi et al., 2008; Weinberger, Fischer, & Stegmann, 2005; Weinberger, Ertl, Fischer, & Mandl, 2005; Weinberger, 2011).

The effectiveness of collaborative learning is a result of good interaction between group members. Argumentation, participation in dialogue, engagement, knowledge acquisition and knowledge creation are essential and most important as they are determined by scripts (Dillenbourg, 2002; Paavola & Hakkarainen, 2005; Sami & Kai, 2009). Dillenbourg *(2002, p. 2)* defined the collaborative script as” *a set of instructions regarding to how the group members should interact, how they should collaborate and how they should solve the problem*. However, Dillenbourg *(2002); Weinberger, Stegmann and Fischer (2010) and Weinberger(2011)* found that collaboration scripts contain a set of instructions to help pupils in forming groups; task definition; task distribution; distributing different responsibilities, activities, and resources within group; time management of each phase; discussion; elaborating arguments and learning materials; dialogue; interaction; solving problem; collaboration; and acquisition and creation of knowledge. Weinberger et al. *(2005)* found that scripts were designed and utilized into learning for facilitating collaboration and cooperation. As to me, on basis of the above definition and plans of scripts, I concluded that the pupils in collaborative learning are guided by the scripts.

2.1.2 Learning in group

It was recognized that placing the pupils in groups didn't mean to work together perfectly *(Johnson, 1991; Kollar, Fischer, & Slotta, 2005; Kreijns et al., 2003)*. There are two types of groups, including collaborative learning groups and traditional learning groups.
Web 2.0 European Resource Centre (2012) reported that collaborative learning is deeply
dissimilar to the traditional model of learning in which collaborative learning was de-
scribed as new learning theory that is compatible with approach of social constructivism
with the pupils who actively participate in collaborative processes and knowledge creation
while traditional learning focuses mostly on transmission of knowledge from the side of
teachers where participation of pupils is rarely observed.

In 2012, Web 2.0 ERC (European Resource Centre) simplifying Web 2.0 Education, an
European Union funded education network project aims at using Web 2.0 technologies in
teaching and learning in the digital age (use of pedagogy of Web 2.0) reported that collabo-
rate learning is learning theory compatible with approach of social constructivism in
which pupils have to create shared documents with easiest access for writing and edit-
ing(Web 2.0 European Resource Centre, 2012)

Scott, Grant, and Mandryk (2003) found out that collaborative working in small groups is
often consisted of a variety of collaboration designs, including working in parallel, work-
ing sequentially in tightly coupled activities, working independently, and working under
roles, such as director and actor. Other roles of group members in small groups during dif-
ferent tasks, including “explainer and commentator” (Kollar et al., 2006, p. 162), “ex-
plainer and explainee” (Dillenbourg, 1999, p. 8), “teacher and learner” (Weinberger et al.,
2005, p. 6), “summarizer and listener” (Kobbe et al., 2007, pp. 215, 220), “recallers and
listener” (Kollar et al., 2006, p. 164) and “speaker and listener” (Brassac, 2006, p. 252).
Group leader and criticizer roles were also identified by (Kobbe et al., 2007)

Several studies (Goodyear & Retalis, 2010; Larusson & Alterman, 2009; Siemens & Titten-
berger, 2009; Stahl, Koschmann, & Suthers, 2006; Web 2.0 European Resource Centre,
2012) suggested the use of technology to enlarge a physical classroom and to support
learning and different types of tasks such as collaborative writing, collaborative editing,
commenting, collaborative presentation, and supporting distance, online and blended/ hy-
brid learning etc. Powerfully, social constructivist theory of learning was found compatible
with both collaborative learning and computer supported collaborative learning (Stahl et
al., 2006; Web 2.0 European Resource Centre, 2012). The above suggestion and finding
lead me to ICT based leaning discussed in the point 2.2 of this research.
2.1.3 Similarities between cooperation and collaboration

Cooperative and collaborative learning were two forms of learning in groups in knowledge-based society. They are different in its structure but share many things. Several studies have documented relationships between those two forms of learning and found the following:

According to Johnson and Johnson (1996) the pupils in collaborative learning are more guided than in cooperative learning but learning in both case is the same and based on dialogues and interactions between group members and sometimes the teacher. Usually the educationalists used them as indistinguishable, mirror image and look-alike.

Istifçi and Kaya (2011, p. 91) noticed that “collaboration requires cooperation” but they went further and added that collaboratively and cooperatively are two approaches used in learning in groups in which all group members are “responsible for the success or failure of the group”.

According to Istifçi and Kaya (2011), the aims of cooperative and collaborative learning are to offer group members the opportunities to obtain, combine and apply skills to solve a common problem and to accomplish shared plans and goals.

2.1.4 Criticism in cooperation and collaboration

Many observations were done by many researchers about practicing the pedagogy of cooperative and collaborative learning. The following was selected among ones:

- Group members have different experiences, observation, knowledge, ideals, understanding, and backgrounds(Van den Bossche, Gijselaers, Segers, & Kirschner, 2006)
- Learning in groups helps the pupils to get extra information and scaffolds from peers. Thus they help pupils to become more intelligent, think logically, engage in dialogue, make good judgment in career as well as to exchange opinions and understandings with others and to use learned materials in different contexts for considerable amount of time (Kreijns et al., 2003)
- Activities of pupils in collaborative learning involve collaboration, coordination, consultation, communication and cooperation (Head, 2003)
• Conflict between group members can be displayed during progress because they do not know each other, have different views and understandings on concepts, irresponsibility, one’s mistake (Van den Bossche et al., 2006) and later they can request a teacher to reform a new group like the solution but in my opinion the solution is not to split up it and reform new one but is to offer it the guidance and facilitation for learning better in group.

• Nowadays, most pupils are known as Digital Natives, Millenials, Net Generation or Homo Zappiens (Bennett, Maton, & Kervin, 2008; Jones, 2012; Kirschner & Karpinski, 2010; Margaryan, Littlejohn, & Vojt, 2011) reason why a good number of group activities becomes more enjoyable among group members, increases pupils’ understanding, involves pupils in dialogues and produces good results when technology is used (Roschelle, Pea, Hoadley, Gordin, & Means, 2000)

• Task outputs of pupils should be related to the teacher’s expectation of learning outcomes (Web 2.0 European Resource Centre, 2012)

2.2 ICT based learning

Many researches (Goodyear & Retalis, 2010; Stahl et al., 2006) have been conducted on how computers can support learning in schools. Different terms have been used to indicate technologies tools and resources employed in ICT based learning. The recent terms such as technology enhanced learning (TEL), computer assisted instruction (CAI), computer aided learning (CAL), networked / online learning, e-learning, intelligent tutoring systems, Logo as Latin and Computer Supported Collaborative Learning (CSCL) were used to refer to the learning situation where technology is used to help individuals to learn. The CAI, CAL, networked / online learning, e-learning, intelligent tutoring systems, Logo as Latin and CSCL, each of them has specific computer education software and applications to support its pedagogical approaches except the TEL which includes both hardware and software and works independently from pedagogical approaches.

To clarify the roles of ICT in learning where computer technology is used to support pupils in their learning, I use in this research the term TEL to refer to the ICT based learning. In formal education (Goodyear & Retalis, 2010) wrote that computer technology comprises computers (e.g: Laptops or PC) for pupils, interactive whiteboards, digital libraries, e-portfolios, learning management systems, simulations, video conferencing, virtual laboratories, programmable, location aware devices, software and application. As to
UNESCO (2009), the use of computer technology as a tool for learning is very important for the development of cognitive activity, self-control and self-esteem of school pupils and enhancement of motivation, pupils’ activities in classroom and instructions.

Sawyer (2006) and Stahl et al. (2006) explained computer assisted instruction (CAI) software and applications as behaviorist based approach that conceived learning as the memorization of facts, intelligent tutoring systems as cognitivist based approach that analyzed the pupil learning in terms of mental models and potentially faulty mental representations; Logo as Latin systems as constructivist based approach argued that pupils must build their knowledge themselves, explore and discover the power of reasoning as illustrated in software programming constructs while CSCL software and applications environments were explained as social constructivist and dialogical based theories that explored how computers bring pupils to learn together collaboratively in pairs, in small groups and in learning communities by directed discourse that would construct shared knowledge.

The TEL was introduced, conceived and authored through three metaphors of learning which are (a) knowledge acquisition represented as “monological approach”, (b) participation represented as “dialogical approach” and (c) knowledge creation represented as “trialogical approach” (Hakkarainen, 2009, p. 13; Paavola & Hakkarainen, 2005, p. 1) and displayed as learning that integrates and explores digital technologies in innovative and transformative ways (Goodyear and Retalis, 2010).

Paavola and Hakkarainen (2005) detected that conception of learning adequate for a knowledge society includes transmission, or construction of existing knowledge to individual pupils (acquisition metaphor), various processes of socialization and growing up to communities and their values (participation metaphor) and individual and collective learning, collaborative, systematic development of common objects of activity (the knowledge creation metaphor). They go further to say that the acquisition signifies human cognition and activity, where important things are seen to happen within the human mind, the participation represents the interaction with the culture, other people and surrounding (material) environment, whereas the knowledge creation emphasizes on individuals, community and on the way people collaboratively.
According to Goodyear and Retalis (2010) TEL covers both hardware such as Interactive whiteboards, smart tables, handheld technologies, tangible objects and software such as CSCL systems, learning management systems, simulation modelling tools, online repositories of learning content and scientific data, educational games, web 2.0 social applications, 3D virtual reality, etc. and is used to cover all circumstances where computer technology plays a significant role in making learning more effective, efficient or enjoyable.

The TEL, a term used to mean learning supported by computers to provide hardware, software, and educational software and applications to three metaphors of learning. In this research, I have selected to use the CSCL systems because they are specialized TEL educational software and applications for transmitting and constructing knowledge in groups, and enhancing the socialization and collaboration among group members.

Today’s technology, some educational software and applications such as Skydive (One Drive), Google Drive, Drop box, Wikis, Blogs, Webmail, Wilma, Outlook, Moodle allow both transmitting, constructing, socializing , collaborating, collecting and sharing with others. As result the term CSCL systems are used in this research to mean both learning management systems and CSCL systems.

This research is primarily emphasizing on applying dialogical model of cognition and its support with computer technology which considers learning to be a process of constructing, growing up, socializing, sharing and collecting to social community and its norms and practices (dialogue between pupils and dialogue between pupils and teachers) and sustaining the creation of individual and collective knowledge (Hakkarainen, 2009) and in second place, focus is to adapt social constructivist which considers learning through interactions among pupils. In addition CSCL systems were seen as example of TEL software which supports social constructivist and dialogical pedagogical approaches which are the focus of my research (Stahl et al., 2006). Social constructivist and dialogical pedagogical approaches were interested in three metaphors of learning i.e., knowledge acquisition, participation to interactions and knowledge creation.
2.2.1 The Computer Supported Collaborative Learning (CSCL) systems

The CSCL software and applications environments offer various forms of pedagogical support which enhance on (a) active engagement of pupils, (b) participation in groups, (c) frequent interaction and feedback, and (d) connections to real-world contexts and the pupils learn largely through interactions, teaching and questioning each other while teachers prepare materials, make them available, motivate, facilitate and guide each pupil (Roschelle et al., 2000; Stahl et al., 2006).

Roschelle et al. (2000) compared CSCL and traditional classrooms and found that the use of CSCL software and applications effectively in classrooms can increase pupils’ subjects understanding and encourage pupils to reason deeply about subjects, and teaching become much better than traditional classrooms where quite poor support for learning are often provided.

Stahl et al. (2006) indicated that CSCL models of learning involving dialogical, social constructivist and use of the software and applications that bring pupils together which offer creative activities of intellectual exploration and social interaction.

Within CSCL, the focus of learning is on collaboration with others pupils rather than directly from the teacher, and computers are used to bring pupils together to learn collaboratively in pairs, in small groups and in learning communities as well as to support collaboration by providing media of communication (e.g. email, chat, discussion forums, videoconferencing, instant messaging,…) and scaffolding for productive interaction (Stahl et al., 2006). Computer collaboration is debated in three settings (Dillenbourg et al., 1995) and those are two or more pupils that collaborate on computer-based task, computer-mediated collaboration and human-computer collaborative learning.

As CSCL supports social constructivist and dialogical theories of learning, Sami and Kai (2009) in their research about a trialogical approach to CSCL concluded that framework of trialogical approach is that of dialogical framework because they use the same epistemic. They noticed that dialogues and trialogues are close approaches.
Like Roschelle et al. (2000) and Stahl et al. (2006) about teacher’s activities, Goodyear and Retalis (2010) pointed out that teacher’s activities and work in CSCL in formal education involve a planning in advance, setting productive and appropriate tasks, making available tools and resources for each task and group activity, monitoring progress of pupils, helping pupils arrange their work individually, in small groups or teams, or as some kind of learning community, giving feedback on pupils’ work and reflection, orchestrating activity in a classroom, providing explanations of ideas and technique, and promoting pupils conversation and engagement in studies.

2.2.2 Social constructivist approach

Social constructivist is known as Vygotskyan theory (Wells, 2000). Social constructivist is the theory of learning and teaching founded by Lev Vygotsky (Powell & Kalina, 2009). Lev Vygotsky is considered as father of social constructivist theory. The teacher played the roles of a facilitator and guide in this theory. It incorporated social interaction, collaboration, interaction between with the teacher and other pupils in learning. The personal critical thinking process, creating deeper understanding, scaffolding, and recognizing the diversity of class were taken into consideration in this theory and served as part of constructivist classroom (Powell & Kalina, 2009).

In social constructivist theory, researches (Dillenbourg et al., 1995; Stahl et al., 2006) have shown that knowledge is constructed through interactions with others and each pupil learns better by using new approaches than learning individually as new approaches involve interaction and they allow pupils to develop their critical thinking and perform better by getting good grades. Beck and Kosnik (2006) utilized social constructivism as an approach that encourages all members of a learning community to present their ideas strongly, while remaining open to the ideas of others and involving social interaction and the whole person: thoughts, attitudes, emotions, values, and actions. Teacher’s input and pupils’ input, discussion and reflection in class have major roles in social constructivist. Social constructivism theory prized that the knowledge is constructed by pupils themselves and teacher to pupil dialogue is very important for learning. In addition, Kim (2001) and Powell and Kalina (2009) revealed that the pupils had to communicate, share and negotiate to create the final product while teacher has to promote the dialogue of material to help the pupils to think critically what they have learned (pp. 2, 245).
Powell and Kalina (2009) found that social constructivist teaching strategies and practices in the classroom included conversation, discussion, and inquiry to make pupils to think and communicate effectively as well as to create social interactive learning environment.

The social constructivist theory emphasized on dialogue, co-construction, collaboration, community building, narrative, positive visioning, importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding and covered activities that helped pupils to express their personalities, and to create relationships that affect what they have learnt (Kim, 2001; Powell & Kalina, 2009; Young & Collin, 2004).

Kim (2001) communicated that social constructivist approaches can include reciprocal teaching, peer collaboration, cognitive apprenticeships, problem-based instruction, web quests, anchored instruction and other methods that involve learning with others.

2.2.3 Dialogical approach

Dialogical approach was categorized (Brassac, 2006; Hakkarainen & Paavola, 2007) as theory of situated and distributed cognition that focus on mechanism of inter-comprehension, communicability, joint meaning-construction space, evolving networking relations, becoming a full member of a community, or full participation. Wells (2000) said that today, the dialogical approach is under descriptions of theories of sociocultural and social constructivist.

Like social constructivist approach discussed in point 2.2.2, the ideas of dialogical approach were also initiated by Lev Vygotsky but he died when overall framework and details of theory were not ready (Wells, 2000). After death of Lev Vygotsky, his ideas were taken up and extended by his colleagues and followers in the Soviet Union, researchers of Europe, North America and the rest of the world (Wells, 2000). The famous researchers to develop and reformulate Vygotsky's ideas were Both Bakhtine, Brassac, Bruner, Jacques, Mead, Trognon, Wells and Vygotski (Brassac, 2006; Wells, 2000).

It is good to notice that the original ideas of Vygotsky related to the dialogical approach were Vygotsky's Theory of Human Development that emphasized on human development by looking at the individuals, the social and material environment with which they
interacted in the course of their development, the history of the social group and particular social events in which a person has became a member or in which an individual successively took part (Wells, 2000).

In dialogical theory (Wells, 2000), knowledge is co-constructed in dialogue, created and recreated in the collaborative meaning-making through discourse between people doing things together where understanding of the issue is under discussion and the common, fuller and clearer understanding is achieved by extending, questioning or qualifying what someone else has said. In contributing to a knowledge building dialogue, a pupil is simultaneously adding to the structure of meaning created jointly with others and advancing his or her own understanding through the constructive and creative effort involved in saying and in responding to what was said. It needs to be emphasized, though, that it is the joint attempt to construct common understandings that the participants recognize as superior to their previous understandings.

Sami and Kai (2009) found that trialogical and dialogical approaches use same dialogical framework and remarked that communication skills, expressions of different perspectives, having multiple voices, sharing meaning, providing shared understanding are emphasized in dialogic theories while in trialogical, trialogues are presented as processes where things and something new are developed collaboratively without repeating existing knowledge and those processes require more and extra effort from people than in dialogues, negotiations on meanings, commenting and discussions.

In this research, the second grade pupils are in period of knowledge building where dialogical theories (dialogues and trialogues) played big roles in their learning. Similar to Stahl et al.(2006) about dialogues and CSCL, when CSCL are used in trialogical activities, the participants are able to create and share, elaborate and transform, organize and reflect on knowledge (Sami & Kai, 2009)

In addition, CSCL software and applications are designed to support pupils, teachers and group processes in learning and CSCL is also concerned with face to face (f2f) collaboration as computer support of learning does not always take the form of an online communication medium for example a group of pupils might use a computer to browse through in-
formation on the Internet or to construct and explore the simulation or representation (Stahl et al., 2006)

2.3 Inclusive education

Inclusive education is an answer to descriptions done by Taymans (2012) and Florian (2004). UNESCO (2009) saw inclusive education as a process of addressing and responding to the diversity of needs of all pupils in schools. Inclusive education deals with participation in learning, cultures and communities, and reducing and eliminating exclusion within and from education. UNESCO (2009) added that inclusion should be seen as a process of strengthening the capacity of the education system to reach out to all learners and it is a key strategy to achieve Education for All which is one of the Millennium Development Goals (MDGs).

Taymans (2012) described pupils with special educational needs as pupils with basic psychological processes and disorder in one or more of the central nervous system processes and external manifestations such as imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations and deficit in attention, reasoning, processing, memory, communication, reading, writing, spelling, calculation, coordination, social competence, and emotional maturity. As to Florian (2004), special educational needs cover many kinds of difficulties in learning such as impairments, learning, emotional and behavioral difficulties.

Referring to research in the UK, Ainscow, Booth, and Dyson (2006) put out six ways of thinking about inclusion, which are

- Inclusion as a concern with disabled students and others categorized as having special educational needs.
- Inclusion as a response to disciplinary exclusion
- Inclusion in relation to all groups seen as being vulnerable to exclusion
- Inclusion as developing the school for all
- Inclusion as Education for all
- Inclusion as a principled approach to education and society

In similar views of inclusion, the ideas of Ainscow et al. (2006) were supported in UNESCO’s report by saying that education should be looked at in different inclusion lens
in which child-pupil should not be seen as a problem to education but seeing the education system as the problem itself. Education through inclusion lens suggest that the education system has the full responsibility to ensure the right to education; (1) it is equipped and ready to handle diversity through flexible teaching and learning methods (adapted to different needs and learning styles); reorienting teacher education; flexible curriculum (response to diverse needs and not overloaded with academic content); welcoming of diversity; involvement of parents and the community; and early identification and remediation of children at risk of failure (2) flexible teaching methods with innovative approaches to teaching aids and equipment as well as the use of ICTs, (3) responsive, child-friendly environments and (4) professional environment working deliberately and actively to promote inclusion for all (UNESCO, 2009). It is not only UNESCO whom supports the ideas (Ainscow et al., 2006) but Underwood (2012) clarified that full inclusion is characterized by routine placement of pupils with disabilities, regardless of type or degree of challenge to learning, in regular classrooms of community schools alongside age appropriate typical peers as well pupils with disabilities receive respect as would any other pupils while Ainscow (2002) suggested that schools should pay attention to needs, curriculum and collaboration in order to help individual pupil to gain access to the learning and enable them to participate successfully in knowledge building and sharing.

Finally, Ainscow et al. (2006), like Underwood (2012), have seen that inclusion is concerned with all children and young people in schools; it is focused on presence, participation and achievement; inclusion and exclusion are linked together such that inclusion involves the active combating of exclusion; and inclusion is seen never-ending process. Thus an inclusive school is one that is on the move, rather than one that has reached a perfect state.

But, it is noticeable that the aims of inclusive education includes (1) to bring the pupils to a level of achievement that would enable them to return successfully to ordinary schools, (2) to redirect special education provision and services away from ways of working that encouraged segregation of pupils towards on much more integrated range of responses, (3) to make all the arrangements for teaching and learning as effective as possible (Ainscow, 2002)
2.3.1 Inclusion in classroom and learning approaches

Concerning inclusion in classroom, is teaching and learning mechanisms enabling all pupils to meet national targets, recognizing and valuing of identities and the diversity of the pupils so that the pupils are accepted as they are and thus arranging for them to learn together in mixed collaborating groups (Ainscow et al., 2006). Those teaching and learning mechanisms can be reached by the means of involving and engaging all pupils in classroom activities individually or collaboratively, giving pupils equal opportunities to the learning materials and accessibility of tools to use, developing social relationships among pupils and helping each other to achieve learning goals and outcomes at maximum level with considerable attention of pupils with learning difficulties and anomalies.

Inclusive education particular in classroom can mean to practice new teaching and learning about how all academic activities might respond to all pupils and schools should take definite steps to overcome the barriers to learning and participation (Ainscow et al., 2006). According to Ainscow (2002), inclusive education particular in classroom can cover the use of available resources i.e., both teachers and pupils in order to simulate and support one another’s learning and participation. In addition, as cited in Ainscow et al. (2006), teachers should identify what works to lead classroom towards good or best practices.

Group problem solving, collaborative problem solving, encouraged participation, new teaching and learning approaches and strategies, group work and active learning approaches include some techniques like mind maps, spider diagrams, questioning and discussing they are used in UK inclusion classrooms to develop thinking skills and provide pupils strategies for problem solving (Ainscow, 2002; Ainscow et al., 2006) and making new friends as well. Florian (2004) briefed the variables thought that affects academic outcomes of pupils such as quantity and quality of feedback, practice, strategy instruction, assessment and motivation.

As for Bigge and Shermis (1999), found that there are the tasks that children cannot perform on their own, but which they can achieve with help from others and this process is known as the use of conception of the “zone of proximal development (ZPD)” originated from Vygotsky. Furthermore, they said that grouping the pupils in well managed small groups can enhance their engagement in interesting, culturally meaningful collaborative problem-solving activities in which two or more pupils interact, jointly try to reach a goal and begin a task with different understandings but arrive at a constructive shared one and
this activity was termed as “Scaffolding”. One can tentatively argue that the collaborative learning or group learning is channelled through ZPD and scaffolding where all input of pupils participants are valued and taken into consideration at time of discussing, negotiating and taking group decision.

2.3.2 Inclusion and technology enhanced learning (TEL)

In inclusive education, the pupils with special educational needs study together with their colleagues without disabilities. In inclusive settings, Department for Education and Skills (DfES) (2001) and Florian (2004) advised educators to work closely with parents of pupils in order to develop areas of learning of pupils. The communication and interaction; cognition and learning; behavior, emotional and social development; and sensory and/or physical were identified (Department for Education and Skills (DfES), 2001; Florian, 2004) as the areas needed to develop among pupils

I consider the ideas of developing the areas of learning as most important in this research. First and most important is the emphasis on developing features and components, which allow pupils to participate actively in the classroom and extra school activities. The activities include studies, hobbies, and all kinds of entertainments. Secondary, the learning approaches of this research are based on learning in groups. The development of those needed areas enabled the pupils to become active member of group of learning. Thirdly, the development of these areas empowered the pupils to use almost all part of their bodies.

As said by Florian (2004), ICT opens new opportunities for participation and inclusion in the culture, curricula and can be used to overcome barriers to learning for all pupils with special attention to those with disabilities.

The results of the research of Vincent (1995) in distance learning showed that ICT in education provided various ways of learning for many people; this includes those who have a disability. The following are the observed advantages:

- Transformation of printed based teaching materials and books into alternative media such as braille or audio for printed-disabled pupils
- Audio transcription for pupils, who require this service,
- Access to computers,
✓ Being home-based and thereby eliminating travel to a conventional institution, which can be difficult for some pupils with a physical or sensory disability.

The results also showed many ways of overcoming of barriers to learning related to both the method of teaching and a pupils’ disability such as the use of audiocassette especially for pupils who have difficulties with printed based teaching materials, videotapes with subtitles for hearing-impaired pupils and pupils with physical disabilities, computers with speech output to enable blind pupils to write with the aid of a word processor, adaptation of software and the provision of alternatives to the keyboard and visual display (Vincent, 1995).

Furthermore, Florian and Hegarty (2004) found out also the ways of overcoming of barriers to learning by the means of ICT, include the use of changing the size of text, the color of hyperlink or adding sound such as a speaking browser, special keyboards to help young pupils with coordination difficulties, screen reader software for the people with visual disabilities, software to help the young pupils with communication difficulties convey choices and the many software packages that help the young pupils practice skills in range of curriculum areas.

Florian (2004) said that technology can help create the conditions for equal opportunity to learn and equal access to the curriculum for all and she communicated six use of ICT in teaching and learning in which it can be used (1) to tutor (i.e. programs, software and applications to teach and study), (2) to explore (i.e. programs, software and applications to allow pupils to interact with materials, to construct knowledge collaboratively, to personalize materials by using different formats such as voices, pictures, visual, etc.), (3) to communicate (i.e. programs, software and applications to enable pupils for example to write emails, to chat, to call, to share knowledge, to recognize and synthesize voice, to read screen, etc.), (4) to assess (i.e. vehicles for orchestrating higher quality assessment and reducing amount of time humans manage assessment process, etc.); it can be (5) applied as tools (i.e. acquiring ICT skills and using tools of technology such as spread sheets programs, word-processing programs, presentation programs, database programs, hand held computers, smart phones, laptops, browsers, touch screen, specialist keyboards, voice activated software, etc.) and it can be used as (6) a management tool (i.e. programs, software and applications to develop individual education plan, targets settings, monitor pupils progress, etc).
2.3.3 Summary of theoretical framework

I used three concepts; collaborative learning, ICT based learning and inclusive education to construct theoretical frameworks for this research. The Technology Enhanced Learning (TEL) was a good term to refer to ICT based learning. Two learning models were presented: social constructivism and dialogical and three metaphors of learning: monologue, dialogue and trialogue linked to TEL in classroom (Hakkarainen, 2009; Paavola & Hakkarainen, 2005). The research (Stahl et al., 2006) found that Computer Supported Collaborative Learning (CSCL) is one of TEL software and applications to support social constructivism and dialogical models of learning in classroom. There is also development of relationships between collaborative learning, scaffolding, CSCL software and applications, monologue, dialogue, social constructivism, trialogue, and inclusion into classroom. There is also a discussion on various interactions such pupil-self interaction, pupil-pupil interaction, pupil-teacher interaction, pupil-material interaction, vicarious interaction and pupil-interface interaction (Soo & Bonk, 1998; Woo & Reeves, 2007), and different roles among small groups such as explainer, commentator, explainee, teacher, learner, summarizer, listener, recaller, speaker, group leader, criticizer, director and actor. The following chapters are dealing with empirical parts.
3  METHODS

3.1 Aim and research questions

As introduced in chapter 1, this research aims to explore functioning of group members in the classroom of diverse pupils where CSCL software and applications are used to support collaborative activities (learning in groups). Learning theories such as dialogical learning (dialogue and trialogue) and social constructivism (interactions) were suitable to support inclusion into classroom among others.

Therefore, this research is set to answer the following two questions:

- What is the role of technology in supporting the pupils’ collaboration?
- How does the CSCL function within diverse primary pupils?

3.2 Participants, context and research design

3.2.1 Participants

The participants were 21 pupils in grade two, one teacher and her assistant in a primary school in Northern Finland. Those pupils consisted of 8 females (38 %) and 13 males (62 %). Their ages were from seven to nine years old. All pupils were white, born in Finland and spoken Finnish language. They were in computer science lessons and instructional language was Finnish. The ICT tools were used as teaching and learning aids and subject matters. Almost all activities were done collaboratively. The learning materials included pupils ‘creativities and textbooks as well as teacher’s lectures.

3.2.2 Procedures

The 2nd grade was selected because teaching and learning in this grade was based on collaborative learning and usually computers were used in learning. Permission from school, pupils and parents or guardians was granted before collecting data. The pupils and one of their parents or guardians signed on consent forms. I had opportunities to discuss with other teachers and read school documents and browsing school posts blog. The primary data
collected from observation, interview and questionnaire were treated along with the second data collected from various sources which also included school documents like school’s pedagogical documents, pupils’ work samples, conversations. Data collected with the questionnaire was quantitative while others were qualitative.

I used five methods of data collection: 1) observations, 2) questionnaire, 3) field notes, 4) interviews and 5) documentary research. All this means that this research is based on mixed methods or methodological triangulation. Data were collected through a diversity of means from a number of sources like pupils, teachers and documents and this process was known as data triangulation (Cohen, Manion, & Morrison, 2007; Creswell & Clark, 2007; Fraenkel, Wallen, & Hyun, 2012; Guion, Diehl, & McDonald, 2011; Lacey & Luff, 2001).

I observed five computer science lessons and recorded them in order to have the video data in this research. There was class teacher and at least one class teacher assistant in every lesson. Every lesson lasted 110 minutes. Every lesson started at 10:15 am, there was a lunch break of 20 minutes at 10:30 am, the lesson resumed at 10:50 am and ended at 12:05 pm.

The titles and aims of the lessons are the following:

Lesson one: Switch on new touch screen windows laptops for first time and use of different screen icons. The aims were to learn to switch on windows laptops and explore different applications such as camera, calculator, maps, internet explorer, etc.

Lesson two: Writing letters into Finnish to the Wikispaces for the pen pals abroad and translated into English using Bing Translator software. The aim was to learn to use the translator program and to format text as personal letter.

Lesson three: Writing stories alone or in pairs by using the Office 365 OneDrive. The pictures were made with Paint and added to the file. The aim was to learn to format a text

Lesson four: continuous of lesson three

Lesson five: Writing plan to start practicing a play by using Office 365 on 2nd grade class site where every pupil can see other pupils’ works. The aim was to reproduce text from pupils’ textbooks as they were.

From lesson two to five, pupils used Wikispaces, Office365 that contains online office applications (e.g. Microsoft word, Microsoft excel, Microsoft power point, Microsoft
Outlook, Microsoft Publisher, Microsoft Access) and OneDrive for saving pupils’ works. All pupils had folders under their names on school’s OneDrive. OneDrive is online document storage offered by Microsoft that stores the document in cloud and share with others. OneDrive can be accessed from anywhere and whenever. OneDrive was previously known as SkyDrive. Pupils worked in groups of 2 to 6 members. The groups have been changed 4 times in 5 lessons observed. Lesson four was the continuous of lesson three and pupils worked within groups of lesson three. Three pupils worked individually twice i.e. in lessons three and four.

Normally, in this class, teacher changed group members every month. During data collection, the changes of groups were based on agreement between me and the teacher. Therefore, I agreed with 2nd grade teacher to practice some exercise where the teacher had formulated the groups of study based on given criteria in order to observe different feelings and participation of pupils in knowledge building within various groups with different members and group size. In addition, the rotation of pupils in different learning groups allowed the researcher to observe different types of interactions occurred in classroom such as pupils to pupils, teacher to pupils, pupils to content and pupils to software interfaces. The practice comprised study alone, study in pairs, study in triads (group of three), and study in small groups (from 4 to 6 pupils) and in all studies, the members of group worked on one computer. In every lesson, I informed teacher in advance what kind of groups I wanted to observe and teacher planned activities accordingly.

3.2.3 Methodology

Methodology is a solution to guide the steps of research. Creswell and Clark (2007, p. 4) defines methodology as “the framework that relates to the entire process of research; methods as techniques of data collection and analysis” while research design was defined as “the plan of action that links the philosophical assumptions to specific methods”. So therefore, it is in this way, that I have decided to use case study as research design, the data triangulation design, mixed methods research or methodological triangulation, thematic analysis, percentage analysis and content analysis to make this research more successful.

Case study

Case study has been defined as “An investigation into a specific instance or phenomenon
in its real-life context” (Cohen et al., 2007, p. 170). Case in education can be a child, a pupil, a group, an event, an activity, a classroom, a social situation, a school, a community. In this research, my case was to examine an activity in one classroom in one school in Northern Finland. The activity consisted of inclusion of diverse primary pupils where ICT tools were used to support collaborative learning and activities. I was interested in understanding how teaching and learning collaboratively in inclusive classroom can work. I observed classroom activities five times. The case study allowed me the use of both qualitative and quantitative approaches to collect data. The use of case study covered multiple methods of data collection like observations, questionnaires, interviews, documents analysis, conversations and written notes. It was more appropriate and fitted in this research. It described real-life context of pupils and teachers into inclusive classroom, their thoughts about and feelings for an activity (Cohen et al., 2007; Daymon & Holloway, 2005; Fraenkel et al., 2012)

As remarked by Cohen et al. (2007), results from case study are strong on reality, comprehensible, even more easily understood by academics and non-academics as they are normally written in the language that people use on daily basis and spoken for themselves. The results can be used to interpret other similar cases and situations. Case study data are collected scientifically and carefully, and powerful in reality which make that the results from an activity related to the case provide valid and rich description, details, and analysis that are comprehensible by wide audience.

### 3.3 Data collection

In following table I will present the instruments used for data collection.

**Table 1. Data collection instruments**

<table>
<thead>
<tr>
<th>Data collection instruments</th>
<th>Respondents</th>
<th>Research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire 2013</td>
<td>21 pupils</td>
<td>2</td>
</tr>
<tr>
<td>Observation in 2013</td>
<td>5 lessons</td>
<td>2</td>
</tr>
<tr>
<td>Interview in 2013</td>
<td>One teacher</td>
<td>2</td>
</tr>
<tr>
<td>Documents, 2013 and 2014</td>
<td>School documents: school’s pedagogical documents, pupils’ work samples,</td>
<td>2</td>
</tr>
</tbody>
</table>
3.3.1 Questionnaire

To collect information, a questionnaire was developed by the researcher which was administered to the pupils of 2nd grade of one primary school pupil for personal answering (Cohen et al., 2007; Cohen, Manion, & Morrison, 2013; Dawson, 2002; Dawson, 2007; Fraenkel et al., 2012; Jack. R Fraenkel & Wallen, 2000; Marczyk, DeMatteo, & Festinger, 2010). (See Appendix 1)

Questions were translated into Finnish language by 2nd grade teacher prior to distributing them to the pupils. Finnish is language of instruction in second grade. All 21 pupils have completed and returned the questionnaire during time of data collection. This technique helped the researcher to collect primary data. Pupils as respondents were asked to indicate their opinion by ticking on that position on given statement which most correspond to what they feel (Cohen et al., 2007). For each statement, a box to tick in was provided.

“The questionnaire is a widely used and useful instrument for collecting study information, providing structured, often numerical data, being able to be administered without the presence of the researcher” excerpted in Cohen et al. (2007, p. 317). It is within this line my questionnaire was administrated by class teacher. I highlight that one pupil granted me the permission on consent form to participate in my research in observation only, but when that pupil saw that my questionnaire is filled anonymously, automatically and voluntarily the pupil asked teacher to fill questionnaire and teacher allowed that pupil.

A questionnaire for 2nd grade pupils was developed and contained three sections.

✓ Section 1 contained the brief introduction of researcher and instructions governed the respondents to answer questions and asked them to give age and gender as identification.

✓ Section 2 contained the definitions of key words used in questionnaire.

✓ Section 3 contained questions I have used rating scales (A Likert scale, Yes/Not) of 4 types of question. There was a total number of 21 questions, these included conversations, scripts, school posts blog and fields notes
one question of type: yes/no, 14 questions of type: yes, partly and no, 2 questions of type: yes, partly, no, don't know, 4 questions of type: always, usually, often, sometimes and never (Cohen et al., 2007; Cohen et al., 2013; Fraenkel et al., 2012; Jack. R Fraenkel & Wallen, 2000; Kothari, 2004; Marczyk et al., 2010).

3.3.2 Direct class observation

The observation took place in classroom. The researcher observed activities of pupils and teachers in classroom without asking any question from the participants and recorded those activities (Cohen et al., 2007; Cohen et al., 2013; Fraenkel et al., 2012; Jack. R Fraenkel & Wallen, 2000; Kothari, 2004; Marczyk et al., 2010). Kothari (2004) said that observation becomes a scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to check and control on validity and reliability.

Direct class observation was a source of primary data and principal data in this research. According to Cohen et al. (2007), observation was used to collect live data from physically going on social situations. This time, the 2nd grade pupils mainly did collaborative activities assisted by CSCL applications and software in different groups. Groups’ members varied from two to six pupils in different time (see pictures 1, 2, 3). The variation of group members depends on how task is difficult or easier according to learning outcomes that require certain level of collaboration and various ideas, skills, and knowledge as well as the wish of the researcher who wanted to investigate how small and larger groups work on collaborative activities assisted by CSCL applications and software. It is noticeable that filmed class observation had facilitated the researcher to picture afresh at quotidian pupils’ behavior that otherwise might be taken for envisaged or go unobserved.

One canon camera and two smartphones (Nokia Lumia and Samsung) were used to film pupils’ and teacher’s activities and pencils, pens, pieces of paper have been used to take the notes.
Picture 1. Group of 5 pupils working together on a laptop in classroom

Picture 2. Groups of 2 to 3 pupils working together on one laptop for each
3.3.3 Interviews

In this method, (see appendix 2), researcher collected data by asking questions in a face-to-face contact to primary school teacher and recorded the conversation. In addition teacher could ask questions and researcher responded to her (Cohen et al., 2007; Cohen et al., 2013; Dawson, 2002; Dawson, 2007; Fraenkel et al., 2012; Jack. R Fraenkel & Wallen, 2000; Marczyk et al., 2010). The questions for interviews were prepared by researcher. Cohen et al. (2007, p. 366)’s guideline for conducting interview said that an interviewer can ask the interviewee to write responses down and its meaning, “Should you write responses down? What messages does this give?” The time of interview, a teacher got school mission in abroad, when she came back, she became sick, and vocation started when she was sick. We decided to answer interview questions by writing down answers. Like direct class observation and questionnaire, interview was also used to gather primary data in this research.
3.3.4 Documentation

During observation, I wrote some important notes from conversation with school teachers, my comments when the pupils were doing different activities and data obtained through the extensive of school documents: school’s pedagogical documents, pupils’ work samples, scripts, and school posts blog. Thus refers to me as descriptive field notes (Fraenkel et al., 2012).

3.4 Data analysis

In following table I will present the instruments used for data analysis.

Table 2. Methods of data analysis

<table>
<thead>
<tr>
<th>Methods</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire 2013</td>
<td>Thematic analysis and statistical techniques</td>
</tr>
<tr>
<td></td>
<td>(Percentage analysis)</td>
</tr>
<tr>
<td>Observation in 2013</td>
<td>Thematic analysis and content analysis</td>
</tr>
<tr>
<td>Interview in 2013</td>
<td>Thematic analysis and content analysis</td>
</tr>
<tr>
<td>Documents, 2013 and 2014</td>
<td>Thematic analysis and content analysis</td>
</tr>
<tr>
<td>Theoretical frameworks</td>
<td>Content analysis</td>
</tr>
</tbody>
</table>

3.4.1 Content analysis and thematic analysis

Those methods allowed the researcher to analyse data of video, questionnaire, and interview and documents by themes (Cohen et al., 2007; Cohen et al., 2013; Dawson, 2002; Dawson, 2007; Fraenkel et al., 2012; Lacey & Luff, 2001; Taylor-Powell & Renner, 2003).

The principal source of data for the research was the transcribed video data. The process of video data analysis started at first time of observation. I analysed video data at every collection by comparing different activities and interaction between pupils, and pupils to teacher/teacher assistant in classroom and then planned and informed teacher what I want to observe next time. For example, the conception of knowledge in pairs, triads, etc. Teacher planned accordingly and informed me the good time for next lesson that met the conditions I suggested. I repeated the same process until the time I was satisfied.
After collecting data, the participants’ answers (interview, questionnaire), classroom observation (video data), field notes, and documents were coded and categorized that gave the themes (Derry et al., 2010; Fraenkel et al., 2012). The collected data were organized into themes to facilitate analysis. Themes have been explained by Fraenkel et al. (2012) as grouping of relevant statements, major ideas from all participants’ experiences and explanation about study.

Before clustering themes, classroom observations (Video data) have been transcribed using Microsoft Excel files. The transcript of video data and data choice were guided by the advice from (Derry et al., 2010) that are focusing on particular information linked to the research questions, aims of research, theoretical frameworks, watching more time major events of video data that best show key events in interpretation. It is in this angle that many attentions were put on switching roles among group members; division of labour; discussions; elaboration and reflection upon their knowledge; motivation; feedback and guidance given to pupils teacher; assistance among peer; the use of CSCL tools; participation in group communication; conversation; talking; listening and writing; sharing among groups; joint actions of group members; commitment of pupils in group; new understanding after assistance; off tasks behaviour of pupils; process of creating new meanings and understanding; how teacher and pupils deal with learning tasks together; listen to each other; knowledge negotiation and argumentation; the task outcome produced by group; specifica-
tion of tasks, resources and groups members by teacher (Barros & Verdejo, 2000; Myhill et al., 2005; Soller, 2001).

3.4.2 Statistical techniques (Percentage analysis)

This method allowed researcher to analyse data collected from questionnaire by calculating percentages of different types of responses and reporting the percentage of the total sample who chose each alternative for each question (Fraenkel et al., 2012). The goals were to describe what the researcher has found by counting the responses of alternative statements for each question and reproducing them in percentages. On the other hand, the percentages can be false if the total number of participants is fewer than 40(Dawson, 2002; Dawson, 2007).
In this research, participants were 21 pupils. As response to avoid false findings, especially in qualitative analysis, Fraenkel et al. (2012) advised every researcher that the use of percentages can come before or after the response that interviewees give to a particular question or description from video data and/or field notes.
4 RESULTS

4.1 What is the role of technology in supporting the pupils’ collaboration?

In answer to the first research question, I went through data gathered from interview, questionnaire, video data and theoretical frameworks and I found that theoretical frameworks answered the first question of my research. From theoretical frameworks, I found that the roles of technology in supporting the pupils’ collaboration are the following:

- Technology offered coworkers the media of communication such as email, chat, discussion forums, videoconferencing, instant messaging (Stahl et al., 2006),
- Technology offered coworkers the scaffolding for productive i.e. technology may assist one another’s learning (Stahl et al., 2006),
- Technology offered coworkers the CSCL software and applications, which allow coworkers to collaborate on single file or same files, irrespective of time and location. The works include collaborative writing, reading, editing, asking questions, answering questions and commenting (Stahl et al., 2006),
- Technology offered coworkers online presentation software that allows collaborators to write, edit, access, and read presentation collaboratively, and present it anywhere they are either online or offline (Stahl et al., 2006),
- Technology offered coworkers online repositories that enable them to upload files and access them elsewhere (Goodyear & Retalis, 2010; Stahl et al., 2006),
- Technology offered coworkers and teachers learning management systems (LMS) that enable teachers to present and share the materials to different groups of coworkers. Different groups of coworkers used LMS to share what they have attained; this includes sharing files from CSCL software and applications, online presentation software and online repositories. Both teachers and pupils can chat, comment collectively through LMS (Goodyear & Retalis, 2010).
- Technology provided to coworkers simulation modelling tools that support autonomy of individual pupil by facilitating every pupil to redo or imitate the same activity for the purpose of developing pupils’ cognitive (Goodyear & Retalis, 2010)
4.2 How does the CSCL function within diverse primary pupils?

Diverse pupils mean pupils with learning difficulties, pupils without learning difficulties and gender. The group comprised of pupils of different learning difficulties in reading, writing, fine motor skills and hearing impairment and some didn’t have; a particular case is a pupil who uses hearing aid instrument. However, same teacher tutors all.

The findings from the data collected from video data, questionnaire, interview, fields’ notes and school documents addressing question 2 falls into four themes (see table 3). All quotations I used in the chapter 4 are reproduced as they have written or spoken by participants.

In table 3 I present the main findings organized in themes and explanations of some key words.

Table 3. Main findings

<table>
<thead>
<tr>
<th>Themes</th>
<th>Sub-themes</th>
<th>Sub-sub-themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning products</td>
<td>Scripts</td>
<td></td>
</tr>
<tr>
<td>(pupils products)</td>
<td>Understanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation at performance</td>
<td></td>
</tr>
<tr>
<td>Product: Teacher ‘s evaluation and criteria</td>
<td>Scripts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Understanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation at performance</td>
<td></td>
</tr>
<tr>
<td>Pupils' and classroom resources' arrangements, and their choice and use</td>
<td>TEL/CSCL</td>
<td>Boy (s) and girl(s)</td>
</tr>
<tr>
<td></td>
<td>Classroom management</td>
<td>Boys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Girls</td>
</tr>
<tr>
<td>The styles of learning for young pupils</td>
<td>TEL/CSCL</td>
<td>Social constructivism (thoughts, attitudes, emotions, values, and actions (Beck &amp; Kosnik, 2006))</td>
</tr>
<tr>
<td></td>
<td>Dialogue (learning of group members,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use collective instructions and slight assistance</td>
<td>Interaction (Cooperation and collaboration)</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mologue - It refers to the reflection of one pupil in group or one pupil is on task while others are off task</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dialogue + Teacher = Group members + Teacher</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- It concerns to the group receives the assistance of teacher and uses that assistance to initiate the task or improve the quality of task outcome to meet standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dialogue + pupil(s) = Group members + Pupil(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- It concerns to the group receives the assistance of pupil(s) from other group(s) and uses that assistance to initiate the task</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trialogue - It concerns to improve the quality of task outcome</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- It concerns to outstanding the task outcome (Over standard)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dialogue + Dialogue(s) = Group members + group members of other group(s) = cooperation of group(s)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- It concerns to compare two or more task outcomes and improve the quality of one / them after negotiation to meet standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- It concerns also to outstanding the task outcome (Over standard)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collective - It refers to the whole class instructions, comments, appreciations and feedback from teacher</td>
<td></td>
</tr>
</tbody>
</table>

4.2.1 Learning products (pupils products) and product (teacher's evaluation and criteria)

Scripts
The script contains all guidelines that aim at facilitating collaborative learning activities. It shows teacher’s tasks and pupils’ tasks. The school has two scripts for collaborative learning and one for individual learning. The two scripts for collaborative learning, one is for
pupils and another one is for teachers. The scripts for pupils show the phases pupils have to follow for building knowledge. The script for teachers shows the phases teachers have to use to give tasks and help the pupils in knowledge building by learning alone or collaboratively. Even if I am going to present those three scripts, my research deals only with two scripts for collaborative learning that involve one for pupils and another one for teachers.

They’re: “

1. The model of knowledge building – (planning alone script)
2. Gaining / constructing/ building knowledge by methods of cooperative learning
3. The teacher’s version as chart describing the process “

(School document, 2013)

The model of knowledge building

The model of knowledge has eleven phases known as A CHECK LIST (the student’s version) that are (1) pupil’s choice of topic/ topic area, (2) pupil’s thinking and knowing before starting the project, (3) pupil’s information from own study book, (4) pupil makes plan of topic, (5) pupil shows plan to the teacher, (6) pupil searching for information and making observations, (7) pupil shows filled in plan to teacher, (8) pupil starts writing study, (9) pupil prints study and gives it to the teacher, (10) pupil edits study and makes changes to it, (11) teacher congratulates the pupil for finishing study (School document, 2013)

Mind maps are tools employed by pupils in this model of knowledge building. All pupils wrote down information related to the plan on mind maps. Information on mind maps is written in different colors according to the sources of information and each source has its own color (School document, 2013)

“The model of knowledge building is freely adjustable according to user’s needs. The phases of this model can be can be used also separately when practicing skills of knowledge gathering and knowledge management. The model has been designed so that by following it, it creates a logical learning path in which the separate phases of learning process create one clear entity. The model is not just a one way learning path but it gives opportunities to go back to the earlier phases when necessary” (6th grade teacher wrote, 2013)

Gaining / constructing/ building knowledge by methods of cooperative learning

Gaining / constructing/ building knowledge by methods of cooperative learning has also 11 phases that are (1) choosing the topic/ the topic area, (2) choosing the sources of infor-
mation, (3) giving the sources of information to the study groups, (4) the study group divides the material among the group members and studies material together, (5) Writing down the keywords (every pupil individually), (6) the group writes down all suggested keywords, (7) connecting keywords together (8) each member of group writes down own conception of the subject using complete sentences or group members make questions (9) the group discusses the written sentences and/or questions and processes the group’s logical/clear conception of the topic using complete sentences (10) every group’s end product is evaluated and compared (11) evaluation of the working process and the outcome (school document, 2013).

The teacher’s version as chart describing the process
This script is for teacher. It describes how teacher gives a task to the pupils, coordinates, guides and evaluates pupils’ activities as mentioned in section 4.2.1.

In conversation with 6th grade teacher related to the three scripts, he explained me that the teachers had to understand what said by all three scripts and tell the pupils what to do for each phase.

The pupils followed instructions from their teachers. In addition, he explained me that the 2nd grade pupils are coached by 6th grade pupils who had considerable experience to follow the same instructions of using scripts and to learn collaboratively. The teacher of 2nd grade has expertise in teaching and using the three school scripts. The 2nd grade teacher uses ICT tools in different lessons but in this research all lessons were from computer science subjects.

“I've been involved in a collaborative learning by means of ICT more than eight times. Every time I do it I learn something more about the tools that we use or about how to plan an activity like this. I teach mostly grades 1 or 2 so the things that we do happen on a very basic level but every experience that I've had has been positive.” (2nd grade teacher, 2013)

The 2nd grade teacher plays an important role at school because she initiates to use scripts among pupils who are at beginner’s level at following scripts and constructing knowledge in groups and phases. In addition, the 2nd grade admitted diverse pupils that mean that the 2nd grade was inclusive classroom; teacher had to use various teaching strategies to bring
the pupils of different characteristics to work together without problems. The 2nd grade teacher had to prepare the pupils how to work collaboratively.

The pupils (85.7 %, 18/21) with agreed at 100% that teacher encouraged group members’ interaction and discussion while pupils (14.3 %, 3/21) agreed the same at greater than or equal 66.7%.

“I use methods of collaborative learning from day one in my classroom. Children sit in groups all the time and we change the seating places once a month so that children get to know each other well. I'll make the children do a lot of group bonding exercises. We do a lot different kind of things in pairs and groups all the time. I emphasize social skills as a part of learning. That way it's easy for my students to work with each other and they don't mind who their partners are “(2nd grade teacher, 2013)

The pupils find importance of working in groups in inclusive classroom. For example pupils (66.7 %, 14/21) confirmed at 100% that they made new friends when they are working in collaborative learning, pupils (28.6 %, 6/21) confirmed also that they made new friends at greater than or equal to 66.7% while pupils (4.7%, 1/21) were less than 66.7%.

Motivation

Engagement in creating knowledge, answering to the task depended on many factors such as motivation of pupils, group members, tools, materials, teacher’s feel, environment for learning (atmosphere in classroom), type of task and targeted learning outcomes (Figure 2).
During process of doing collaborative activities, teacher and pupils created environment for learning that stimulated engagement in learning. Many strategies to stimulate pupils to innovate, perform and create solutions for the tasks have been used. Teacher granted pupils to work in their freedom that create unlimited movement and a mixture of sounds in classroom.

Examples of strategies to create positive atmosphere in classroom

The 2\textsuperscript{nd} teacher did or dais following:

- Try it first yourself
- Take five! Or/and great! And shake pupils’ hands
- Smile to welcome pupils and to appreciate pupils’ outcomes, questions and arguments
- You are first group to accomplish the task
- At lunch time, teacher can eat together with pupil who needs it

Pupils did following:
1. Smile to appreciate their task process and outcome, teacher’s or peer’s assistance
2. In process of collaborative task, peer embraced each other to show the agreement of common understanding of the task
3. At the end of collaborative task to show appreciation, group members embraced each other because they have completed the task successfully.

4. Classmate said: “Show me your screen”

5. Classmate said: “Tell me how you have done this”

6. Classmate said: “Show me how you have done this”

7. Let me come and show you how I have done this.

8. In process of collaborative task group members had shaken hands to show the agreement of common understanding of the task.

9. At the end of collaborative task to show appreciation, group members had shaken hands because they have completed the task successfully.

10. At the beginning of classroom activities, pupils stood up and greeted teacher.

11. At the end of classroom activities pupils said good bye to the teacher by shaking hands.

**Understanding**

Teacher used different strategies like talking, writing on board, displaying on projector screen, drawing, hand movements and mind mapping to make pupils understand the task. Every task has been started by teacher’s instructions. Teacher’s instructions contained both information related to the task and how pupils were going to do the task (e.g. forming group, ICT tools, resources). If pupils had doubts about what teacher said, they were free to ask questions and teacher answered them. In the task, teacher kept moving in class and gave assistance to particular group. Assistance of teacher covered both technical and subject content issues. Teacher can fix and configure ICT tools if they met problems when pupils were working with them. Class teacher assistant played the roles of supporting teacher to scaffold pupils working in groups.

**Evaluation at performance**

Every task should have marking/grading scheme. Marking/grading scheme shows important points to consider and allocates the marks for each important point in the task. The data suggested that teacher had the recommended points for groups’ tasks products. The evaluation at performance was classified into two types, standard and over standard. In this research, the task product was at standard level if it contained at least the recommended
points. The task product was at over standard level if it included all important points and sometimes additional points related to it.

Examples, teacher asked pupils to write an essay of 5 lines. Some pupils wrote those five lines and formatted the text with alignment, spacing, font colors, and font styles; underline style, underline colors, and size. Other pupils included pictures and drawing designed from other software like paint. Teacher cannot inhibit innovative and creativity of the pupils. Teacher had to accept, encourage them and appreciated their achievements. From data one can tentatively argue that the boys identified that teacher supported all useful ideas from pupils and helped them to become skillful in them. As a result boys frequently used collective learning than collaborative learning. It seems from these data that the boys were more energetic and wanted to know everything teacher appreciated in classroom. More details are in Table 3.

The data suggested also that girls were also more innovative and creative but they enjoyed staying and working in their groups most of time. Thus, rarely when boys wanted to check their screens to see what they were doing, some of them refused and changed the position of their laptops.

4.2.2 Pupils' and classroom resources' arrangements, and their choice and use

Inclusion studied the fitness of classroom infrastructure, TEL/CSCL, classroom management and group members. The 2nd grade had diverse pupils and they used to learn in group by the means of ICT tools. Leaning alone was possible but was not frequently used. The members of group were both girls and boys. Nevertheless, group members can be only boys or girls or girl(s) and boy(s). Some of the group members had special education needs such as difficulties in reading, writing, fine motor skills and hearing impairment and some didn’t have. One pupil used hearing instrument. There were not groups with special mentor. All groups benefited from same teacher and her assistant. At time of data collection, pupils worked into groups of 2 to 6 members. The concentration on joint task among 2nd grade depended on many factors. Some of them were tools and pedagogy to be used, planned activity and groups.

“As I told earlier, I teach mainly grades 1 and 2 so every time I use the collaborative learning by means of ICT I have to plan it carefully and based on the tools used
before or if the goal is to learn a new tool, it has to be something simple. But I've also noticed how fast the children learn new things at that age and how keen they are in learning collaboratively. Children also enjoy learning by means of ICT so it's a very good combination. I think that for the smaller children it's best if the children work in pairs or in groups of three on one computer, laptop or tablet. We've also done some things in groups of four but then usually someone stays out of the action and then learns less than the others” (2nd grade teacher, 2013)

All pupils (100%, 21/21) agreed with teacher that they real enjoyed working in group. Majority of pupils (96 %, 20/21) expressed their ideas freely when they were working in groups. All pupils (100%, 21/21) agreed that when they were working in collaborative learning, the dialogue was open for all members of group, no specific roles and tasks to accomplish individually and all members actively participated in the joint task. The pupils (85.7 %, 18/21) liked learning by means of ICT tools at level of 100% and pupils (14.3 %, 3/21) at level greater than or equal to 66.7%. The pupils (66.7%, 14/21) are satisfied with the learning materials accessibility at level of 100% while pupils (33.3 %, 7/21) are satisfied at level of great than or equal to 66.7%.

Bing translator, laptops, Office365 (One Drive, Office web applications), projector, projector screen and Wiki spaces were ICT tools to support daily learning in second grade. They were known as TEL as they comprised hardware and software. Office365 applications contain CSCL software and applications, and online storage. Projector and projector screen have been used by teacher for collective instructions and lectures. Wikispaces were used by pupils for the pen pals abroad. Bing translator is software used to translator from any language to another. The 2nd grade teacher, used TEL and learning in groups to help pupils to fit in inclusive classroom as she said:

“I’ve noticed that if a child has difficulties in learning for example in reading and writing ICt is a very good tool in motivating them. Ict tools also help when children have difficulties with their fine motor skills. It's easier for them to write with a computer than with a pen. Ict tools give them a chance to concentrate on the text instead of the producing. Collaborative learning by means of ICT is also efficient way of learning social skills because you have to share one computer with others, talk and compromise in order to get the work done”. (2nd grade teacher, 2013).
In addition, the pupils (81%, 17/21) communicated easily to group members through ICT tools.

**Classroom management**

The teacher was a problem solver and promoter of knowledge in collaborative learning. The teacher or class teacher assistant didn’t disturb the freedom of pupils. The pupils moved around classroom, celebrated in case they had got a success in the tasks but teacher was always manager and follower of all movements and activities of pupils in classroom. When the pupils went outside of context like celebrating, off task, conflicts of ideas, talking unrelated, teacher arrived at them directly and asked them what happened. Furthermore, when pupils were progressing and met challenges, they called teacher for assistance.

The data from observation discerned few cases teacher used gender in classroom like boys, girls and lady. Almost of these cases occurred when teacher addressed to the pupils worked in group of boys or group of girls. Teacher uses the names of pupil(s) frequently instead of using the gender such as boy or girl.

The data showed that teacher used frequently three affirmative forms of instructions in assistance. Form of “You” for specific group and “We and everyone” for whole class. Some examples here “You can write about your autumn vacation” for specific group and “Here's a task for you - we need to input all of your user accounts. How can we do that? Find out or We have 10 minutes, so try to write the letter in 10 minutes so we can send it or Just a moment, everyone please be quiet! I'm going to…” for whole class

Two interrogative forms of instructions were frequently used. Form of “you?” for specific group and “all of you?” for whole class. Some examples here “did you succeed?” for specific group and “Have all of you managed to open the computer?” for whole class

Furthermore, when the pupils were or reflected on the task, they needed quite environment that can avoid any kind of disturbance. If anyone tried to interrupt their activities, they may ask to stop it either by talking or by showing sign. The following picture shows one sign used by one pupil to ask group member to stop disturbing thinking and attention paid on task.
4.2.3 The styles of learning for young pupils

The collaborative activities are the last stage of doing common task. The young pupils are processes dealing with knowledge construction that lead to the end group task product. Sections of scripts, motivation, understanding, inclusion, and evaluation at performance have given more details on preparation of collaborative activities.

At this stage, the group members were interacting each other around one laptop. All groups had task to do, environment of working was created, and tools to use and learning materials were available. Script provided the guidelines to follow. Teacher motivated pupils, made tools and resources available, coordinated classroom activities, guided, scaffold and facilitated learning. The pupils were already motivated by teacher but tools also increased motivation and scaffold the pupils.

**Collaborative activities model**

The general overview of collaborative activities in second grade is presented in Figure 3. The cycle of general overview of collaborative activities model started by collaborative activities followed by participation in dialogue/discussion which included acquisition of knowledge and self-reflection, group task product and knowledge building, and prior knowledge.
In collaborative activities model, the pupils helped each other and had interest to know everything. All pupils were active in their groups especially in pairs. Class teacher assisted the pupils regularly. Teacher always moved around the classroom, knew the names of pupils, asked collectively the progress of pupils most of time to identify the groups which needed the assistance and helps them. The CSCL software and applications prompted and hinted the pupils of how to use the software and applications. Thus, it meant that teacher; class teacher, pupils and CSCL software and applications provided scaffoldings to pupils. The pupils in group were able to talk, think, write and edit the task at same time. In addition, some of them were able to have fun for each step of task completed successful, took break when they were in working time. Unlimited movements of pupils and noise were presented in classroom. I called noise but normally they were the voices from discussion, argumentation, and negotiation when pupils were working collaboratively. As shown in Figure 3 collaborative activities started by teacher’s instructions governing the task itself, brief explanation of the task, forming groups, distribution of ICT tools and learning materials. Pupils listened carefully to the teacher, asked questions if they didn’t understand and
started to connect the task to the knowledge they had. The pupils participated actively in
dialogue/discussion/negotiation when they were working together. During this process of
doing task together to achieving group task product, pupils got different scaffolds, reflected
on their knowledge acquisition and contributed as much as they can. The knowledge ac-
quired in current collaborative activities became prior knowledge for next collaborative
activities.

The Computer Supported Collaborative Learning (CSCL), social constructivism
and knowledge construction

The findings from observation suggested that as the number of members of group in-
creased, the number of assistance decreased, the time of being off task increased (only for
the groups of boys), the time of being on the task (adding new ideas, editing existing ideas
in CSCL software and applications, talking) rotated among members and enjoyment in-
creased. On other hand, as number of members of group decreased, the number of assis-
tance increased, the time of being off task decreased, reflection and being on the task in-
creased.

“Collaborative learning by means of ICT is also efficient way of learning social
skills because pupils have to share one computer with others, talk and compromise
in order to get the work done” (2nd grade teacher, 2013)

Not only teacher who saw the roles of CSCL in promoting social skills in inclusive class-
room because pupils (66.7 %, 14/ 21) confirmed at 100% that they made new friends when
they were working in collaborative learning, pupils (28.6 %, 6/21) confirmed also that
they made new friends at rate of greater than or equal to 66.7% while pupils (4.7%, 1/21)
made new friends at rate less than 66.7%

The data indicated that TEL/CSCL assisted knowledge construction in many ways. The big
roles played by TEL/CSCL were to allow group members to work together on one task,
and to prompt other group members by simple coming at place and watching on screen
what other groups have done during collaborative time or accessed their tasks from online
storage in their free time. Many other roles were observed such as saving task and access it
outside of classroom or school wall, language barrier breaking as the pupils are able to
correspond into many languages because they can translate from any language to Finnish
and vise versa, turning left or right laptop screens to show peers what they have done, dis-
placing laptops to the new environments comfortable with the steps of task like taking pictures, recording their voices, drawing, etc. Reducing workload (e.g. mistakes or errors are erased by either delete, backspaces buttons, undo or cut operations, etc), easy to recover the work lost unknowingly, use of different storage, facilitating teacher to monitor what pupils are doing were also observed.

The Computer Supported Collaborative Learning (CSCL) played also the role of sharing group task products, and participating in the pen pals abroad through Office 365 on 2nd grade class site and Wikispaces

**Group task products**
The data showed that the quality of the groups tasks products achieved by groups of pupils comprising at least one pupil with learning barrier and group of pupils without pupil with learning barrier didn’t show any difference.

“I have to say that I haven't noticed difference in the quality of work that children do whether there is a student with barriers in group or not. I think it's like this because in my experience children with barriers perform better by means of ICT than without ICT. I've also noticed that if there is a student with some kind of barriers in a group the other students in the group help them to get the work done, they share a mutual responsibility of the work that they are given. I have seen students who have learning difficulties but are really good at handling ICT tools. They can shine in the eyes of other students when they go around the class and help other students with the tools” (2nd grade teacher, 2013).

The data showed that the method of getting group task outcomes were different. The difference was based on gender. Two methods and three types of groups were identified. There were methods of trialogue and dialogue. There were also group of boys, group of girls and group of boy(s) and girl (s). All groups participated actively in dialogue to perform the task and got scaffoldings from tools, teacher, class teacher assistant and peers. One can claim that the statement number 10 of collaborative script, which said that “every group’s end product is evaluated and compared”, can have double interpretation. It seems that some pupils can comprehend that they should compare the groups ‘end products themselves while others understand that teacher’s evaluation comprises also comparison of all products of groups.
Table 4. Methods of learning in dialogue and trialogue

<table>
<thead>
<tr>
<th>Items</th>
<th>Group of boys</th>
<th>Group of girls</th>
<th>Group mixing boy(s) and girl(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration</td>
<td>Focused on the task</td>
<td>More focused on task than other groups</td>
<td>Focused on the task</td>
</tr>
<tr>
<td>Classroom movement</td>
<td>Some boys were for all time moving in classroom and checking screen by screen of other groups of boys. If they found new things they tried first to add them, if not they asked help from that group with new things or teacher/class teacher assistant and added similar to their task product. If moved boys found that they had new thing and visited groups didn’t have they can let them know</td>
<td>Girls, first before moving they checked if teacher or class teacher assistant was available (not giving assistance to other groups). They raised hand and teacher came to help them. If teacher or class teacher assistant was busy for long time with other group, they were coming at the teacher and asked teacher to assist them. They can stand around teacher till time they went together or they can return to their place, waited teacher but they continued to try the task. I remarked few cases; they tried and got answer before teacher reached at them or asked assistance from other groups.</td>
<td>Girls can be rarely bored and disturbed when the group members i.e. boys started to move to check what other boys have done or when other boys came to see what they have done or when the boys returned back and started to insert what they have seen on screens of others or when boys got assistance from other boys and took long time.</td>
</tr>
<tr>
<td>Recreation during task progress</td>
<td>Because of unlimited movement within classroom, some boys were found outside of their groups more times while other members remaining working. Sometimes, all group members can be together</td>
<td>Girls took planned break all time of doing task. Either they were on the task or off task but all together.</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Group task product</td>
<td>Products covered collective ideas mainly from group members plus all groups having at least one boy and assistance from teacher or class teacher assistant.</td>
<td>Products covered group ideas from group members plus assistance from teacher or class teacher assistant. They can rarely invite classmate-girl to show them few things.</td>
<td></td>
</tr>
<tr>
<td>Products covered group ideas from group members plus assistance from teacher or class teacher assistant. They can rarely invite classmate-girl to show them few things.</td>
<td>Products covered group ideas plus little collective ideas from all groups having at least one boy and assistance from teacher or class teacher assistant.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methods</td>
<td>Dialogue + triologue (frequently)</td>
<td>Dialogue + triologue (rarely)</td>
<td>Dialogue + triologue (occasionally)</td>
</tr>
</tbody>
</table>
5 SUMMARY OF FINDINGS

The main purpose of this Master’s thesis research was to explore the use of technology to support collaborative learning into the classroom of diverse young pupils, aged of seven to nine years old. My main focus was to focus on CSCL software and applications into inclusive classroom for supporting knowledge building where the pairs or small groups of pupils with and without special education needs do the tasks together on one laptop and share the same goals by using the principles of cooperation and collaboration. There is also an exploration of interactions between pupils-pupils and pupils-teachers, roles of technology to support the pupils’ collaboration, guidance and facilitation of teacher into classroom.

The study answered two research questions:

1. What is the role of technology in supporting pupils’ collaboration?
2. How does the CSCL function within diverse primary pupils?

The study used case study as research design and instruments as observation, questionnaire, interview, field notes and school documents, which made it methodological triangulation. There is total number of 23 participants for data collection; these included 21 pupils, one teacher and her assistant which made it data triangulation. The data gathered in this study were analysed using thematic analysis, content analysis and statistical techniques especially percentage analysis.

1. Roles of technology in supporting pupils’ collaboration

The ICT based learning showed that technology supports pupils ‘collaboration by offering them the media of communication such as email, chat, discussion forums, videoconferencing, instant messaging; the scaffolding for productive; CSCL software and applications; learning management systems; simulation modelling tools; online presentation software, and online repositories

2. Collaborative and cooperative learning

There were two forms of script to guide teachers and pupils in collaborative and cooperative learning. One form were for pupils, another were for teachers. The pupils’ script was known as “building knowledge by methods of cooperative learning” and described phase’s group members followed to construct knowledge together by starting on choosing topic and ending on the evaluation of group product. The teachers’ script was
known as “The teacher’s version as chart describing the process” and described how teacher gave a task to the pupils, coordinated, guided and evaluated pupils’ activities.

All pupils agreed that they really enjoyed working in group and the dialogue were open for all members of group, no specific roles and tasks to accomplish individually and all members actively participated in the joint task. Majority (96 %) of pupils expressed their ideas freely when they were working in groups. It was noticeable that teacher emphasized on promoting social skills as a part of learning. Thus, they helped pupils to work together with each other without minding who their partners were. Many pupils (95.3%) confirmed that they made new friends when they were working in collaborative learning. There was also a confirmation from data that the young pupils learnt fast new thing when they were in learning collaboratively.

It ascertained further that some pupils stayed out of the action when they worked in groups of more than three pupils.

3. The CSCL software and applications

The used CSCL software and applications were Office365 or Office web applications, and Wikispaces. The data revealed that the CSCL software and applications were designed with various scaffolding icons and texts which prompted and hinted the pupils on how to perform the tasks and use CSCL software and applications. It was found out that CSCL software and applications facilitated and motivated the pupils with difficulties in reading and writing, and pupils with difficulties with fine motor skills to write rather than writing with pens. All pupils were satisfied with the way of accessing the learning materials from CSCL software and applications and many of them (81%) communicated easily to the group members by the means of CSCL software and applications. It was found further out that CSCL software and applications were efficient way of learning social skills because group members worked cooperatively to get a group task done.

4. Guidance and facilitation of teacher into classroom

It was discovered that teacher encouraged group members to interact and discuss as it were indicated by all pupils with rating scale of 100-66.7 %. It was disclosed upon end of data analysis and interpretation that the teacher was a problem solver i.e. technologi-
cal and pedagogical, promoter of knowledge in collaborative learning, planner of activities, tools to use in collaborative learning based on lesson goals, manager and follower of all movements and activities of pupils in classroom.

5. Inclusion

It was found out that teacher used various didactic materials and pedagogy models for making pupils to be fit in classroom. The didactic materials included projector screen, projector, laptop, board, markers, and other ICT tools like Office365, Office web applications, and Wiki spaces. The pedagogy models included talking, writing on board, displaying on projector screen, drawing, hand movements and mind mapping. The pedagogy models also included monthly seating arrangement, doing a lot of group bonding exercises and making use of pairs and small groups all the time. There was an indication that teacher disseminated instructions into two forms, that were instructions addressed to specific group or whole class. Teacher used the names of pupils frequently instead of using gender such as boys or girls,

6. Knowledge building

The researcher found out that knowledge building was a result of pedagogical environment, individual reflection and interactions among pupils themselves, interactions of pupils and teachers, interactions of pupils and contents, and interactions of pupils and ICT tools. The pedagogical environment was created by both teacher and pupils.
6 DISCUSSION AND CONCLUSION

The aim of this research is to study how pupils learn in a group in inclusive classroom, how pupils with disabilities actively participate in collaborative learning mediated via computers, how teachers facilitate and guide this teaching and learning as well as interactions. The study answered two research questions:

1. What is the role of technology to support the pupils’ collaboration?
2. How does the CSCL function within diverse primary pupils?

I portrayed on three concepts, collaborative learning, ICT based learning and inclusive education to construct theoretical framework for this study. Based on CSCL, a literature of ICT based learning allowing collaborative learning; two models of learning were identified: social constructivism, dialogical and three learning metaphors: monologue, dialogue and trialogue to guide collaborative activities in classroom (Hakkarainen, 2009; Paavola & Hakkarainen, 2005; Stahl et al., 2006; Web 2.0 European Resource Centre, 2012)

A case study research approach was taken for this study because it demonstrated the real context of inclusion into the classroom of diverse primary pupils where ICT tools were used to support collaborative learning and activities. It empowered the researcher to observe the pupils’ and teachers’ activities into classroom, interview teachers, question pupils, take notes.

It is good to remember that there are findings say that technology can support collaborative writing, collaborative editing, commenting, collaborative presentation, online repositories and supporting distance, online and blended/ hybrid learning (Goodyear & Retalis, 2010; Larusson & Alterman, 2009; Siemens & Tittenberger, 2009; Stahl, Koschmann, & Suthers, 2006; Web 2.0 European Resource Centre, 2012)

There is also an indication says that technology can support pupils in transforming printed based teaching materials and books into alternative media such as braille or audio for printed-disabled pupils and audio transcription (Vincent, 1995)
Carmien and Fischer (2005) and UNESCO (2009) argue that the technology can be utilized as a tool for learning, which is very important for the development of cognitive activity, self-control and self-esteem of school pupils and enhancement of motivation, pupils’ activities in classroom and instructions. Carmien and Fischer (2005) argued also that technology can be utilized as a tool for living, which is important to enable pupils to perform things that they could not do by themselves.

From these findings one can tentatively argue that technology supports diverse primary young pupils in collaborative writing and editing, online storage and in sending and receiving emails. The CSCL applications and software were used as tools for learning and tools for living into inclusive classroom. Moreover, one can claim a further research on online collaborative commenting, collaborative presentation, and learning among diverse pupils of primary school.

On the one hand, the use of available resources i.e., both teachers and pupils, and dialogical and social constructivism learning approaches in inclusive classroom suggested involving and engaging all pupils in classroom activities collaboratively, giving pupils equal opportunities to the learning materials and accessibility of tools to use, developing social relationships among pupils and helping each other to achieve learning goals and outcomes at maximum level with considerable attention of pupils with learning difficulties and anomalies (Ainscow et al., 2006). But, on the other hand, the use of group problem solving, collaborative problem solving, new teaching and learning approaches and strategies, group work and active learning approaches, which include some techniques like mind maps, spider diagrams and group discussions are used in inclusion classrooms to develop thinking skills and provide pupils strategies for problem solving (Ainscow, 2002; Ainscow et al., 2006).

Interestingly, Takala, Hausstätter, Ahl, & Head (2012, pp. 307, 314) suggest also that inclusion necessitated schools to develop pedagogies; including ways of teaching that are suitable for a diverse range of pupils; thereby enhancing the learning experience for all pupils, the learning from each others, the feeling of being equal with peers, the full access to the learning resources and opportunities, and the social skills. Johnson (1991); Soo and Bonk (1998) and Woo and Reeves (2007) argued that pupils should share leadership in collaborative learning groups or rotating roles or switching the roles.
Furthermore, Van Boxtel, Van der Linden, and Kanselaar (2000) and Wang (2014) showed that collaborative learning supports social interaction that stimulates elaboration of conceptual knowledge, and increases the pupils’ motivation to learn from others, to discuss ideas, to negotiate meaning, and to engage in activities.

It seems from these data that some of teacher’s teaching strategies are to develop the pupils’ abilities to work with others, to think critically, to become creative and innovative, to learn together and to have social skills. The data suggest also that the development can be attained by asking pupils to try and solve the task first themselves, seat in groups at all times, do group bonding exercises, encouraging of interaction and discussion among pupils, and regrouping the pupils.

In other hand, the findings are arguably logical that during collaborative learning the young pupils don’t have specific roles and tasks to accomplish individually and all members of group actively participated in the joint tasks. The data suggest that pupils that work in same group consult each other, their teacher and the assistant, other groups or individuals in order to promote their understanding and comprehension of the task or problem to attain the group’s goals, which may be related to “effective help-seeking strategies” by Webb (2009, p. 4), “promotive interaction” by Kreijns et al. (2003, p. 339) and Soller (2001, p. 47), “scaffoldings” by Ludvigsen and Mørch (2010, p. 290), Myhill et al. (2005, pp. 10,11) and Sawyer (2006, p.11) and “guided discovery” by Myhill et al. (2005, p. 13).

In context of school, the CSCL applications and software are built with features that perform scaffolding (Ludvigsen & Mørch, 2010) and support pupils, teachers and groups in teaching and learning process (Stahl et al., 2006). One research finds that when CSCL applications and software are used in trialogical activities, the pupils are able to create and share, elaborate and transform, organize and reflect on knowledge (Sami & Kai, 2009). Roschelle et al. (2000) found that the use of CSCL software and applications effectively in classrooms can increase pupils’ subjects understanding and encourage pupils to reason deeply about subjects. Moreover, Sami and Kai (2009) found that dialogic theories focused on communication skills, expressions of different perspectives, having multiple voices, sharing meaning, providing shared understanding while in trialogical, trialogues are presented as processes where things and something new are developed collaboratively without repeating existing knowledge and those processes require more and extra effort from pupils than in dialogues.
From research findings, it can be suggested that any group comprising at least one boy work dominantly in trialogue, while a group comprising of only girls work dominantly in dialogue. Hence, the interpretation of scripts, the nature of computer science lessons and the number of girls, which was almost a half of what of boys can be a cause of the differences based on gender. A further research can be suggested on them.

It seems from these data that there are mixture of sounds (lots of noise) and unlimited movement in Finnish classroom but, Professor Kirsi Tirri explained them as the following: according to Pisa studies, “Finnish students have been ranked highly in sciences, math and reading. Finland is the best in European countries in all three domains. In sciences and reading, Finland has always called Mandate top three countries, the classroom climate in Finland is very exceptional, Finland classrooms have more noise than for example Asian countries in Japan or china. Finnish classroom has lots of noise; this can be explained by nature of classroom. Finland has democratic classroom climate and Finland is getting good learning results” (Teemu Nikki, 2012, Apr 26).

In addition, created pedagogical environment, existing physical environment of the classroom and its resources, relationships between teachers and pupils, management of time in classroom play considerable roles in motivating pupils ‘creativity, and developing creative skills and outcomes as well as thinking critically (Davies et al., 2013).

Also, computers allow pupils to use combination of visual and verbal to support knowledge development, learning and reflection while Internet aids in sharing, combining understandings and collaborative learning (Sawyer, 2006).

Teacher’s activities and work in CSCL involve a planning tasks, tools and resources in advance, , making available tools and resources for each task and group activity, monitoring progress of pupils, helping pupils arrange their work in small groups, giving feedback on pupils’ work and reflection, orchestrating activity in a classroom, providing explanations of ideas and technique, and promoting pupils conversation and engagement in ies.( Goodyear & Retalis, 2010)

The findings are arguably logical that teacher’s roles involve planning collaborative learning carefully based on the tools used before or the goal of lesson, solving a problem i.e.
technological and pedagogical, promoting of knowledge, managing and following of all movements and activities of pupils in classroom.

6.1 Implication

The results of this study found out the practical and theoretical relationships between collaborative learning, ICT based learning and inclusive education into classroom. Theoretically, collaborative learning deals with criteria to form groups and rules to work in group to enable pupils to achieve group goals. ICT based learning deals with ICT tools and pedagogy offered by them to support collaborative learning. Inclusion in education deals with working together with diverse pupils and finding out a solution of pedagogy models and ICT tools which suit to every pupil and helps everyone to attain learning goals and outcomes.

Through practicing of those three concepts into classroom, teachers and pupils are able to create positive atmosphere in classroom, construct knowledge in small groups, utilize various ways of communication and sharing, and develop social skills and gain access to learning materials.

I used effective instruments such as classroom observation, questionnaire, interview, fields’ notes and school documents which contributed in finding crucial and live information related to the study.

Although this study is a case study, on the one hand the researcher suggests avoiding generalization of results but, on the other hand the researcher can tentatively argue that results can be transferred to similar context.

6.2 Limitations

There are a number of limitations in this research.

- First, the nature of computer science lessons is different from other subjects. Again the use of ICT tools that include computers, Internet and CSCL software and applications play two roles in 2nd grade class. One of roles is “tools for learning” means
pupils use those ICT tools for acquiring new skills about tools themselves; the second is “tools for living” means ICT tools have been used to assist pupils and teacher in the performance of tasks such as presentation, correspondence, chatting and sharing (Carmien & Fischer, 2005).

- secondly, the researcher did not understand the language of instruction for 2nd grade which is Finnish

6.3 Suggestion for further research

The results of this study give ideas to the researcher to conduct similarly research within young pupils of different skin colors (races) or carry out similar research with other subjects like mathematics, elementary sciences or English, or conduct research on effective communication and contribution of individual pupil in collaborative learning supported by technology in the context of social interaction
7 EVALUATION

In this part I present the reliability, validity and ethical issues to evaluate my research process and researcher’s position

7.1 Reliability and validity

The selection of the topic, planning the steps to follow, the use of case study, data and methodological triangulation for collecting data to investigate the research questions, and thematic analysis, percentages analysis and content analysis for analysing collected data whereby data were organized into a few manageable themes and tables based on participants’ responses for further analysis has increased reliability and validity in this research that gave greater confidence in the findings and conclusion (Cohen et al., 2007; Cohen et al., 2013; Fraenkel et al., 2012; Kothari, 2004; Lacey & Luff, 2001; Lacey & Luff, 2009; Marczyk et al., 2010).

In addition, conducting the research in second grade where pupils and teacher used collaborative learning and computers to support learning, and the use of observation, interview, questionnaire, field notes, my objectivity and honesty, and documentation have also provided additional information in my findings and conclusion(Cohen et al., 2007; Cohen et al., 2013; Fraenkel et al., 2012; Kothari, 2004)

7.2 Ethical evaluation

In all researches, ethics deal with the truth of conducting study (Fraenkel et al., 2012).

American Psychological Association(2010) and Fraenkel et al. (2012) advised every researcher to consider the most three important ethics which are protecting participant identity, treating participants with respect, and protecting participants from both physical and psychological harm. Ensuring the accuracy of scientific knowledge and protection of intellectual property rights were advised to be considered (American Psychological Association, 2010)
The ethics issues have been emphasized in this research. I have taken the following measurements to protect school and participants in this report. The name of school, names and faces of participants were treated anonymously. The faces of participants were covered and no names of participant and name of school appeared in this report. The data collected they have been used by the researcher only in purpose of this research; no one else had access to the data and are stored and protected as stipulated in Research Council for Culture and Society especially in Education field, Academy of Finland. However, data are protected according to Research Council for Culture and Society especially in Education field, Academy of Finland, this research followed APA 6th ethical rules also. APA 6th ethical rules suggested me to make available data to the qualified professional researchers of Faculty of Education, University of Oulu at any time within 5 years minimum after submission of my Master’s thesis for the purpose of the accuracy of the report that allow them to confirm the analyses and results (American Psychological Association, 2010).

The video data were translated from Finnish to English at time of transcription. I was with translator at time of translation in order to avoid sharing data to unauthorized people, errors and bias of data can occur when translator wanted to use his own interpretation. The translator is a Finnish native and speaks English fluently. First, I watched video data and wrote down the parts (different intervals of time) of data where teacher or/and pupils were talking. Together with translator we watched those parts and transcribed what they were talking.

As introduced earlier in section of procedures, my research was “overt” that means the participation was voluntarily at all times, participants were explained honestly what I am doing and I was known and identified to the participants (Cohen et al., 2007; Cohen et al., 2013; Dawson, 2002; Dawson, 2007; Fraenkel et al., 2012). The pupils and their parents after having got clear image of research aims, time and type of data I needed to conduct this research they signed “informed consent “ before collecting data (American Psychological Association, 2010; Cohen et al., 2007; Cohen et al., 2013; Dawson, 2002; Dawson, 2007; Fraenkel et al., 2012; Marczyk et al., 2010). At beginning, one pupil signed to participate in observation only, later that pupil asked teacher to participate in questionnaire filling.
My studies including this Master’s thesis were financed by University of Oulu together with Ministry of Education, Rwanda. I collected data from different participants. A copy of the Master’s thesis will be sent to the Oulu University library and to everyone who has taken part in the study who has requested a copy (Dawson, 2002; Dawson, 2007)

I acknowledged the works (published and unpublished books, journals, blog posts, newspapers) of others in this research. I presented the results from collected data without falsification. I was honest towards the participants, participants’ information and results in my research (American Psychological Association, 2010; Cohen et al., 2007; Cohen et al., 2013; Fraenkel et al., 2012).
# REFERENCES


Kugelmass, J. (2004). What is a culture of inclusion. *EENET-Enabling Education, 8*(3)


OECD. (2008). *Innovating to learn, learning to innovate*. Secretary General of the OECD.


Appendix 1

This questionnaire is part of a research study conducted by Learning, Education and Technology masters Student University of Oulu. The questions are to be answered on an individual basis by student of 2nd grade in [Name of primary school]. Please do NOT write your name on the questionnaire as this study is anonymous. Thank you very much for taking the time to complete our questionnaire, your effort is greatly appreciated.

Student age: 

Student gender: 

Definitions:
- Yes=3  Partly =2  No =1          Don’t know (Not able to judge)=0
- Yes=3  Partly =2  No =1
- Always =5  usually = 4   often = 3  sometimes= 2  never = 1
- ICT tools (Computer hardware, software and networks as well as electronic devices and assistive technologies for pupils…)

Question: For each statement, tick in box ✓ shown in the beginning of the word that describes your opinion about given statement

Q1: I like collaborative learning [group work]
  ✓ Yes  ☐ partly  ☐ No

Q2: I like to learn by means of ICT tools
  ✓ Yes  ☐ partly  ☐ No

Q3: I like to work in collaborative learning [group work] when I am using ICT tools
  ✓ Yes  ☐ partly  ☐ No

Q4: I communicate easily to my group members through ICT tools.
  ✓ Yes  ☐ partly  ☐ No
Q5. I feel better in collaborative learning [group work] than in individual learning
   [ ] Yes   [ ] partly   [ ]

Q6: I like learning alone
   [ ] Yes   [ ] partly   [ ] No

Q7: Collaborative learning [group work] via ICT has helped me to learn/ to work effectively in groups
   [ ] Yes   [ ] partly   [ ] No

Q8: I prefer to learn in group than learning individually!
   [ ] Yes   [ ] partly   [ ] No

Q9. When working in collaborative learning [group work], I express my ideas freely
   [ ] Yes   [ ] partly   [ ] No

Q10. When working in collaborative learning [group work], I make new friends
   [ ] Yes   [ ] partly   [ ] No

Q11. When working in collaborative learning [group work], some group members try to take almost whole for discussion
   [ ] Yes   [ ] partly   [ ] No

Q12. When working in collaborative learning [group work], some group members want to talk and not listen
   [ ] Yes   [ ] partly   [ ] No

Q13. My teacher encourages group members’ interaction and discussion.
   [ ] Yes   [ ] partly   [ ] No

Q14: I am satisfied with the learning materials accessibility from platform
   [ ] Yes   [ ] partly   [ ] No

Q15. When working in collaborative learning [group work], I was listened to
   [ ] Yes   [ ] partly   [ ] No   [ ] Don’t know

Q16. When working in collaborative learning [group work], communication is very effective
   [ ] Yes   [ ] partly   [ ] No   [ ] Don’t know

Q17. I real enjoy working in group most of time
   [ ] Yes   [ ] No

Q18. When working in collaborative learning [group work], some group members do not speak at all and they silently sit
   [ ] Always   [ ] usually   [ ] often   [ ] sometimes   [ ] ever
Q19. When working in collaborative learning [group work], I got specific roles and tasks to accomplish

☐ Always ☐ usually ☐ often ☐ sometimes ☐ never

Q20. I am satisfied in collaborative learning [group work]

☐ Always ☐ usually ☐ often ☐ sometimes ☐ never

Q21: I can be more active with ICT than ordinary teaching

☐ Always ☐ usually ☐ often ☐ sometimes ☐ never
Appendix 2

Interview for teacher

1) How many times have you been involved in a collaborative learning by means of ICT like once, two to five times, six to eight times, more than 8 times? Summarize your experience

2) Tell me in general about application/use of collaborative learning by means of ICT. You can emphasise on teacher’s activities and feelings, student’s activities and their feelings

3) In inclusive education, there are pupils without barriers to learning and the pupils with barriers to learning for example pupils categorized as having special educational needs, pupils categorized as having emotional and behavioral difficulties and pupils categorized as having disciplinary difficulties are admitted in same classroom and learn together.

   A) Generalize about effectiveness or difficulties of communication and management of classroom activities in collaborative learning through either group work on table or facilitated by ICT tools (Here I recall you that ICT tools means the use of computer hardware, software and networks as well as electronic devices and assistive technologies for pupils…)

   B) Teacher is trained to handle the problems related to the learning difficulties but pupils are not trained. How do you prepare the pupils to work together?

4) You have assessed the works done by the pupils. Could you tell me by comparing how quality of the works achieved by group of pupils comprising at least one pupil with learning barrier and group of pupils without pupil with learning barrier?