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Raija Latva-Karjanmaa

**OWN PACE, OWN SPACE, OWN FACE,
HUMAN, AND TOOL SUPPORT**

Mediators in Web-Based Self-Regulation Learning

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Raija, Leila and Tuula with their mother Raili Latva-Karjanmaa

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Abstract

The focus of the study is to identify how mediation supports a web-based course on self-regulation. In the context of education, mediation can be defined as a supporter or promoter of learning. Mediation selects, interprets, and amplifies objects for human learners. The study creates an integrated view of mediators as learning promoters based on Vygotsky's (1978) and Feuerstein's theories (1990, 1991) for studying mediators in web-based learning. This study presents an integrated definition of mediators which focuses on the task, quality and types of mediators and suggests the following: (1) mediators are learning promoters who trigger, support, and amplify learning; (2) learning requires high-quality mediators, and the quality of mediation is ensured by mediated learning experiences; and (3) mediators can be social/human mediators or tool/symbolic mediators. This integrated view is then evaluated based on the empirical research results.

The study analyzes an asynchronous web-based learning environment (IQ Form) from the perspective of mediation; this learning environment was designed for the Finnish Virtual University (FVU). The research setting involves students from the Karelia University of Applied Sciences. The IQ Form environment aims to help students take charge of their own learning process, i.e., develop their self-regulative strategies and skills. The IQ Learn section of IQ Form includes tests, a tutorial with assignments, and a diary to develop students' learning skills and strategies.

The research focuses on mediators that support learning self-regulation by analyzing students' experiences of learning support on a web-based course for learning self-regulation. The methodological approach used, on a philosophical level, qualitatively relies on phenomenology, while at the methodological level, the approach relies on the qualitative research tradition. The study includes two pre-studies and one actual research phase. The main source of data was 14 interviews of first-year students in a Business Information Technology degree program. In addition, 12 students were included in the two pre-studies. The interview data were also supported by the students' 56 diary texts, which were

comprised of written assignments sent to their online teacher and background information collected from the students. The data analysis developed into a triangulation between qualitative clustering, a structured empirical phenomenological analysis, and a narrative analysis. The phenomenological analysis was decisive for finding the mediators.

The research results suggest five kinds of mediators in this web-based self-regulation setting. The phenomenological analysis made it possible to discover the mediators supporting or triggering students' learning processes. The mediators found were the following: *own pace*, *own space*, *own face*, *human* and *tool*.

The mediators own pace, space and face were born situationally due to the special circumstances of web-based learning; they were not pre-designed or arranged as were the human and tool mediators. As a mediator, own pace promoted experiences of being able to study when the time and the mood of the student were right for studying and made it possible to pause and let the student's thoughts to mature. Own space promoted concentration and informal studying experiences. It provided the students with the experience of having their own place in which to think deeper without disturbances from the classroom or peer students. Own face triggered experiences of daring to having private, personal thoughts among the students about their learning. The human and tool mediators are the traditional mediators connected to the learning context and pedagogical idea of the course. They are, to an extent, uncontrollable by the student. The human mediator (online teacher) triggered the experience of trust, guidance, and monitoring. In terms of the tool mediator (tests, tutorial, and diary), the tests promoted students' understanding of themselves as learners, the tutorial helped students to analyze themselves as learners via the assignments, and the diary made students to elaborate and produce thoughts about themselves as learner, which many students experienced as very demanding.

The mediators found in the study increased the students' sense of being in charge of their studies and learning. This study proposes that attention should be given to mediating factors and their particular features in web-based learning. Mediators should be offered that encourage learners to take charge, make their own space in learning, and carry their personal thoughts without fear of being criticized. The role of the human mediator in web-based learning of self-regulation should also be further developed.

The future research tasks need to focus on learners' experiences of mediation in order to identify the mediators in various settings. Research is needed on which mediators are functional in technology enhanced instruction, it's individual and social learning spaces. Studies are also needed about how technology based mediators can be adapted to the needs of various groups of learners.

Keywords: mediation, mediators, self-regulation, digital learning environments, individual learning spaces, social learning spaces

Raija Latva-Karjanmaa

OMA TAHTI, OMA TILA, OMAT KASVOT SEKÄ IHMINEN JA TYÖKALUT TUKENA

Välittäjät itsesäätelyn tukena web-pohjaisessa oppimisessa

Tiivistelmä

Tutkimuksen tavoitteena on tunnistaa, miten välittyneisyys (engl. mediation) toimii oppimisen tukena web-pohjaisella itsesäätelyn kurssilla. Kasvatuksen ja koulutuksen yhteydessä välittyminen voidaan määrittää oppimisen tukemiseksi tai edistämiseksi. Välittyminen valikoi, tulkitsee ja korostaa opittavia asioita oppijalle. Perustuen Vygotskyn (1978) ja Feuersteinin (1990, 1991) teorioihin tutkimuksessa luotiin integroitu määritelmä välittyneisyydestä. Tutkimus esittää integroidun määritelmän välittäjistä (engl. mediators), joka tiivistyy välittäjien tehtäviin, laatuun ja tyypeihin. Integroidun näkemyksen mukaan (1) Välittäjät (engl. mediators, ovat oppimisen edistäjiä jotka virittävät, tukevat ja vahvistavat oppimista; (2) Oppimisessa tarvitaan korkealaatuisia välittäjiä, joiden laadun varmistavat välittyneet oppimiskokemukset. (3) Välittäjinä voi toimia ihminen tai työkalu. Tämän määritelmän toimivuutta arvioitiin web-pohjaisella itsesäätelyn kurssilla empiirisin menetelmin.

Tutkimus toteutettiin analysoimalla Suomen virtuaaliyliopistolle kehitettyä ei-reaaliaikaista oppimisympäristöä (IQ Form) ja sen kautta saatuja välittyneisyyden kokemuksia. Tutkimuksen kohderyhmänä oli Karelia-ammattikorkeakoulun opiskelijoita. IQ Form oppimisympäristön IQ Learn -osion tavoitteena on auttaa opiskelijoita ottamaan vastuu omasta oppimisprosessistaan, i.e. kehittämään itsesäätelystrategioita ja -taitojaan. IQ Learn -osio sisältää testejä, tutoriaalinen oppimistehtävineen sekä päiväkirjan opiskelijoiden oppimistaitojen ja -strategioiden kehittämiseksi.

Analysoimalla opiskelijoiden kokemuksia tutkimus keskittyy niihin välittäjiin, jotka voivat tukea opiskelua web-pohjaisella itsesäätelyn kurssilla. Tutkimuksen lähestymistapa on metodologisesti filosofisella tasolla fenomenologiseen ajatteluun pohjautuva ja menetelmätasolla laadulliseen tutkimustraditioon perustuva. Työ sisältää kaksi esitutkimusta ja yhden varsinaisen tutkimusvaiheen. Päätielänelähteinä ovat 14 ensimmäisen vuoden liiketalouden tietotekniikan koulutusohjelman opiskelijan haastattelua. Lisäksi kahdessa

esitutkimusvaiheessa oli mukana 12 opiskelijaa. Haastattelujen lisäksi tutkimusaineistona olivat myös opiskelijoiden verkko-opettajalle toimittamat 56 päiväkirjatehtävää, sekä heistä kootut taustatiedot. Aineiston analyysi muodostui triangulaatioksi ja siinä sovellettiin laadullista klusterointia, empiiristä fenomenologista analyysia ja narratiivista analyysia.

Tutkimustuloksina web-pohjaisessa itsesäätelyn oppimisympäristöstä löydettiin viisi välittäjää. Fenomenologinen analyysi mahdollisti oppimista tukevien ja virittävien välittäjien löytymisen. Välittäjät, jotka löydettiin ovat: *oma tahti, oma tila, omat kasvot sekä ihminen ja työkalut*.

Oman tahdin, tilan ja kasvojen välittäjät syntyivät tilannekohtaisesti eli situationaalisesti, johtuen web-pohjaisen opiskelun erityisolosuhteista – näitä välittäjiä ei suunniteltu tai organisoitu ennalta kuten ihminen- tai työkalu – välittäjiä. Välittäjänä oma tahti edisti opiskelijan kokemuksia siitä, että hän voi opiskella ajasta ja paikasta riippumatta silloin, kun tunnetila on oikea. Se mahdollisti myös tauot oppimisessa ja salli ajatuksille aikaa kypsyä. Omat kasvot toivat uskallusta yksityisille ja henkilökohtaiselle ajatuksille omasta oppimisesta. Ihmisen ja työkalu olivat perinteisiä välittäjiä, jotka liittyivät oppimisen kontekstiin. Ne ovat vain vähissä määrin opiskelijoiden kontrolloitavissa. Ihminen välittäjänä, eli tässä tapauksessa verkko-opettaja, aikaansai kokemuksia luottamuksesta, opastamisesta ja opintojen seurannasta. Työkalu-välittäjät kuten testit, tutoriaali ja päiväkirja edistivät itsen ymmärtämistä oppijana. Testien avulla opiskelija sai tietoa siitä, millainen on oppijana. Tutoriaali haastoi opiskelijat analysoimaan itseään oppijoina. Päiväkirjan kautta opiskelijat joutuivat työstämään sekä tuottamaan omia ajatuksia kirjoittamisen kautta, mikä oli monista hyvin vaativaa.

Tutkimuksessa löydetty välittäjät lisäsivät opiskelijoiden kokemusta siitä, että he voivat hallita opiskeluaan ja oppimistaan. Tutkimus suosittaa, että web-pohjaisessa opiskelussa välittäviin tekijöihin ja niiden ominaisuuksiin tulisi kiinnittää erityistä huomiota. Tarjolla tulisi olla välittäjiä, jotka rohkaisevat opiskelijoita ottamaan vastuuta ja luomaan oman oppimistilansa sekä tuottamaan esille omia ajatuksiaan vailla arvostelun pelkoa. Tulisi myös kehittää ihmisen roolia välittäjänä verkkopohjaisilla itsesäätelyn kursseilla.

Tulevaisuuden soveltavan tutkimuksen avulla tulisi tutkia opiskelijoiden kokemuksia välittymisestä, jotta eri ympäristöissä toimivat välittäjät voitaisiin identifioida. Tulisi tutkia, mitkä välittäjät toimivat teknologiapohjaisessa opetuksessa, sen yksilöllisissä ja sosiaalisissa tiloissa. Tutkimusta tarvitaan myös siitä, kuinka teknologiapohjaisia välittäjiä voidaan kehittää niin, että ne soveltuvat erilaisille oppijaryhmille.

Avainsanat: välittyminen, välittäjät, itsesäätely, digitaaliset oppimisympäristöt, yksilölliset oppimisen tilat, sosiaaliset oppimisen tilat

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I have had the privilege to work on many projects and research programmes related to learning during the last two decades. These experiences deepened my personal interest in educational philosophy and e-learning, particularly how to advance human learning potential in virtual settings.

I am grateful for the creative pioneering spirit and stimulating cooperation I encountered at the Helsinki University of Technology (HUT, now Aalto University) during the 1990s when the challenges of online learning were first introduced to me. I never had a dull day with my innovative colleagues.

In 1999, I was invited to work as the scientific secretary on the planning committee for the new Life as Learning (LEARN) research programme at the Academy of Finland. In 2000, I was named the Assistant of Educational Philosophy at the Department of Education at University of Helsinki and the coordinator of the IQ Form project for Finnish Virtual University. These tasks brought me back to my roots in education research projects, which I worked on during my Master's studies in Jyväskylä. Hannele Niemi engaged me deeper in the research area of learning and handed me a metre-high pile of books from learning scholars, including Feuerstein. Shortly after this, I had the opportunity to prepare cooperative projects for the national research program in the Nordic countries, the United Kingdom and the Netherlands; following this, I was named the LEARN coordinator. While preparing and coordinating this national endeavour, I was greatly encouraged by Senior Science Officer Eili Ervelä-Myrreen at the Academy of Finland. At the end of the LEARN research program I became involved with the Stanford Center for Learning and Innovations (SCIL) at Stanford University. I organized collaborative workshop for researchers between SCIL and LEARN with Professor Stig Hagström and his colleagues. I was encouraged to prepare a proposal about the implementation of CICERO Learning network, by Minister of Education, Tuula Haatainen after our correspondence. I had related to her that University of Helsinki had been preparing a similar kind of network as SCIL with Professor Hannele Niemi and some experts. As the Coordinator of CICERO Learning, I had the joy of preparing many networked research project proposals, which were concerning utilizing the newest digital technologies in institutional education and various communities and linking partners in private and public sectors.

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I first became interested in research on learning and education when I worked as a substitute teacher in comprehensive schools in Sweden and Finland. After studying chemistry at the Abo Academy, I studied under the University of Jyväskylä's education faculty and was deeply impressed with philosophical, sociological and educational arguments from Professors Hannu Olkinuora, Sirkka Hirsjärvi, Jorma Kuusinen and Tapio Vaherva. These professors were all faculty members in the Department of Education; my time with them encouraged my respect for the Humboldtian *Bildungsuniversität* and national philosopher Snellman. I was introduced to research projects on learning while working as a research assistant for the Department of Education's project on pedagogic support for small groups in schools. Within the philosophy department, I attended inspiring lectures from Professor Reijo Wilenius and lecturers Seppo Sillman and Juhani Aaltola; I also enjoyed discussions with Departmental Coordinator Eeva Sillman and Senior Lecturer Leena Kakkori. My special thanks go to Lecturer Lauri Mehtonen, who evaluated my paper on phenomenological ethics and encouraged my work on phenomenological philosophy. As I became an active member of the university's student union, I encountered the famous 'Jyväskylä spirit' within my fellow student activists. We discussed the role of science in society and were affected by the heritage and idea of human sciences (*Ihmistieteet*) put forth by the nationally famous philosophers Matti Juntunen and Lauri Mehtonen, who were active at the University of Jyväskylä in the 1970s and 1980s.

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1 INTRODUCTION

This study examines the role of mediation in learning self-regulation. The researcher's interest began in the late 1990s with curiosity about the increasing notion of mediation in learning and the growing amount of media-delivered courses, especially web-based courses, in higher education. The focus of the study is to identify mediating as support in a web-based course on self-regulation. The task of this study is

to explore mediators as learning supporters of self-regulation in web-based settings.

The study focuses on analyzing an asynchronous, web-based learning environment designed for the Finnish Virtual University (FVU) from the point of mediation. The environment aims to enable students to be in charge of their own learning process, i.e., to develop their self-regulative strategies and skills.

Learning is changing due to technology. The development of web-based learning environments has expanded during the last decade. Web-based learning solutions provide new possibilities and enable learners to learn on their own in their own way. This is why web-based learning entails more than only learning technology; it can be a renewed way of learning according to Säljö (2004). Furthermore he emphasizes that digital technologies are important and powerful as learning improvers, but not in a linear sense. They are important as part of a media-induced transformation of learning in a much wider proposition than currently. (Säljö 2004, 490).

This research focuses on using a web-based course for developing self-regulation. The course was offered through the FVU for students at the Karelia University of Applied Sciences (Karelia UAS). The students used a web-based learning tool to develop self-regulative skills. The tool used is IQ Learn, which is part of the IQ Form course system. IQ Learn has been one of the most popular services offered by FVU. IQ Form was a part of the common service platform of FVU, which was free for online use by students and teachers at Finnish higher education institutions. The FVU platform was provided with links to online courses and university services as well as service systems offered directly by FVU to support learning by Finnish students in the higher education system.

1.1 The rationale of this study

A great demand exists for an understanding of what kind of learning support is needed in web-based learning, in particular Finnish universities of applied sciences.

The following issues present the educational rationale of this study.

- The number of learner-driven environments is increasing. An increasing number of higher educational studies are made with the help of new technology-based learning environments. Self-determined students are sought in these new environments, and the environments require learners to manage and regulate their own learning. The novel learning environments are less instructor- or teacher-conducted and more learner-driven (Steffens, 2006, p. 353; Hofer et al. 1998, p. 73). According to Lee and McLoughlin (2007, p. 21) higher education curriculum and instruction are transforming with the emergency of Web 2.0 technologies and social software tools.
- Lee and McLoughlin (2007) conclude that “A range of learner-centered pedagogies should afford students a true sense of agency, control, and ownership of the learning experience, and the capacity to create and disseminate ideas and knowledge” (p. 32).
- Lajoie and Azevedo (2006) observe that self-regulated learning skills are crucial to learning effectively in computer-based learning environments. Azevedo et al. (2005) note that when using hypermedia environments, students must have effective self-regulatory skills. These skills are needed to “control the sequencing of instruction and time spent learning, to access multiple representations of information, and to make choices about non-linear multiple representations” (Azevedo R., et al., 2005, p. 382).
- Naidu (2013, pp. 253–255) states that online education is growing rapidly and challenging conventional educational practices. Clow (2013) states that the clear finding is that dropout/non-completion rates are substantially higher among Massive Open Online Courses (MOOC) users than in more traditional education. Devlin (2012) notes in his blog, “make no mistake about it, MOOC education is survival of the fittest.”
- The dropout risk in web-based courses is a reality. The possibility to choose poses a dropout risk and a positive challenge for students. According to Williams and Hellman (2004), asynchronous online instruction allows choices that traditional instruction does not offer. This is an important reason for why learning self-regulation can be critical to

academic success in online courses (Williams & Hellman, 2004, p. 73–74).

- Support is needed in web-based learning. Park and Choi (2009, pp. 207–217) found that dropout rates in online courses depend on organizational support and that motivating students is important among adult learners in higher education. Lower dropout rates can be achieved if course designers or instructors find ways to enhance the relevance of the course.
- According to an evaluation of European research on learning with digital technologies, teachers, learning tools, and suitable assignments all help improve the quality of learning and self-regulation (Beishuizen, 2011, pp. 199–120).
- The particular issue found in universities of applied sciences in Finland (also called polytechnics) is a relatively high dropout rate. Kalima (2011) observed that during the years 2001–2007, the national mean dropout rate was 9.1 for polytechnic students. The expectation is that students will graduate in 4–5 years from universities of applied sciences; however, less than half of students graduate in seven years.

1.2 Mediation as a supporter of learning

Mediation can be an act by a parent, teacher, or peer (Feuerstein, 1990) or it can be a mediative tool, such as a text or a toy (Vygotsky, 1978). Mediators are promoters or supporters of the human learning process. The definition of mediation used in the context of learning in this study is as follows:

Mediation can be defined as a supporter or promoter of learning. It selects, interprets, and amplifies the objects to the human learner. In a learning situation the human, tool, or symbolic mediators, present in interaction with the social context, provide support to the development of cognitive and metacognitive processes of the human being.

This view is built on Vygotsky's (1978) and Feuerstein's (1990, 1991) theories of mediation. In this study, their theories are seen as *complementary* to each other and will be explicated further in Chapter 3 with an integrated view of mediators as learning promoters. According to Vygotsky (1978), learning is a mediated activity with tools, signs, and social interaction. He brought the idea of tool, symbolic, and social mediators to the analysis of the learning process. Vygotsky (1978, p. 67) states that mediators select, change, amplify, and interpret objects for the learner. Feuerstein (1991, 1990) states that mediation on the quality of interaction between a human being and his or her parents, teachers, peers, etc. To Feuerstein (1990, 1991), mediation is a specific form of interaction with

certain qualities that require a mediator. At the core of his view is an emphasis on human mediators and certain qualities of mediated interactions that need to be fulfilled.

1.3 The research question

The research question concerns the type of mediators that can be traced in web-based self-regulation learning. This question is studied by analyzing students' experiences with learning support in a web-based course on self-regulation.

The research question is as follows:

What kinds of mediators support learning self-regulation in web-based settings?

1.4 The structure of the study

The study begins by presenting the context: studying mediation as a promoter of web-based learning of self-regulation. The research task of this study focuses on the type of mediators that can be traced in web-based learning of self-regulation. This topic is studied by analyzing students' essential experiences with learning support in the web-based course. The theoretical view of self-regulation and mediation are presented. The study outlines the challenges of learning self-regulation in web-based settings and asks, "What kinds of mediators support web-based learning of self-regulation?"

The theoretical approach to mediation in the context of learning is based on two main theoreticians of mediated learning, Vygotsky (1978) and Feuerstein (1990, 1991). Their theories are presented as complementary to each other via presenting an integrated view of mediators in learning.

The research design relies on phenomenology on a philosophical level, while the methodological choices include a qualitative approach to studying the human experience. The research includes two pre-study phases and one actual study phase. Data gathering was realized through semi-structured interviews, diary assignments, and a background information form. Data analysis developed through a triangulation of three methods: qualitative clustering, descriptive phenomenological analysis, and narrative analysis.

The mediators supporting learning are found through phenomenological analysis of the students' experiences. The mediators are described through the experiences they evoked in the students: through their own language, through generalized meaning units and finally through five synthesized meta-level themes.

Table 1. The research structure.

THE CONTEXT: MEDIATION AS SUPPORT IN WEB-BASED LEARNING OF SELF-REGULATION				
Studying mediation in a web-based course on self-regulated learning	Presenting the research question: What kinds of mediators support web-based learning of self-regulation?			Reviewing research on web-based mediation in the context of self-regulation
MEDIATION IN LEARNING				
Key aspects of mediated learning by Vygotsky (1978) and Feuerstein (1990, 1991)			Presenting the integrated view of mediators of learning	
THE INTEGRATED THEORETICAL VIEW AND REFLECTIONS OVER THE THEORETICAL PERSPECTIVES				
The integrated definition of mediators in learning based on Vygotsky (1978) and Feuerstein (1990, 1991).		Digital technologies from the perspective of mediation		The challenge of mediation and the origin and agency of self-regulation
RESEARCH DESIGN AND METHODOLOGY				
Methodological choices of studying human experience	Presenting the research setting	Data gathering and its phases	Data analysis by triangulation	The trustworthiness and ethical issues of the research
ANALYSIS WITH TRIANGULATION				
Qualitative clustering	Descriptive phenomenological analysis			Narrative analysis
THE RESEARCH FINDINGS				
DISCUSSION				
CONCLUSIONS				

2 THE CONTEXT: MEDIATION IN A WEB COURSE ON SELF-REGULATION

2.1 The quest for mastering one's own learning

This study concerns students at a university of applied sciences developing their self-regulation through a web-based course. The need for self-regulated learners is growing for two main reasons. First, the role of the learner as a passive receiver of information is changing. He or she can be an active knowledge producer in charge of his or her own learning process. Second, the development of technologically transmitted learning environments require and allow individual study paths.

Williams and Hellman (2004, pp. 71–82) state that self-regulation affects academic success; this has been clearly demonstrated by researchers such as Zimmerman & Schunk (2001), Pintrich and De Groot (1990), and Pressley and Ghatala (1990). Furthermore, self-regulated learners are able to benefit much more from online courses compared to less self-regulated learners, but there is a greater demand for self-regulation in this kind of education. Research on promoting self-regulation online has been conducted during the last decade. Williams and Hellman (2004) assert that extending research on self-regulation into the area of online learning is reasonable and that online instruction allows more learner choice. Zimmerman (2008, p. 172) notes that hypermedia learning environments have great potential for improving learning, but they require personal initiative and skill.

2.2 Defining self-regulation

According to Zimmerman (1998, p. 4), learners can be described as self-regulated to the degree that they are meta-cognitively, motivationally, and behaviorally active participants in their own learning processes. Self-regulation is a broadly accepted concept among researchers to describe the learning strategies and skills used by individual students. Boekaerts and Cascallar (2006, p. 16) state that self-regulation involves active, iterative self-steering processes that target cognitions, feelings and actions. Paris and Byrnes (1989, p. 169) argue that self-regulated learners seek challenges with persistence and sometimes with inventiveness in problem solving. Self-regulated learners also set realistic goals, use a battery of resources, and approach academic tasks with confidence and purpose. Pintrich (2000) stresses self-regulation as a constructive process, observes the contextual features of the environment, and

defines self-regulation as “an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment” (p. 453).

2.3 Viewing self-regulation through its sub-components

This study uses the IQ Learn section of FVU’s IQ Form platform. Its tools were built for learning self-regulative skills and strategies. Pintrich and Ruohotie’s (2000) research was adapted for IQ Learn (Niemi, 2002). According to Niemi (2002, p. 16), Pintrich’s theory of three sub-components of self-regulation can be viewed through questions such as “How do I trust my capacities?” “What are my strategies in learning?” and “How can I expand my learning skills?” The sub-components of self-regulation in this study are called the following:

- Forethought, which is the student’s trust in his or her capacity to learn;
- The student’s strategies in learning; and
- The student’s cognitive and metacognitive skills.

This study defines self-regulation as follows: Self-regulation is personal metacognition, will, and action in the learning process developed in interaction with the learner and the social environment. Self-regulated learners set goals, plan, monitor, and reflect learning using their cognitive abilities and their motivation to perform.

2.3.1 Forethought: The student’s trust in his or her capacity to learn

Forethought comprises the student’s trust in his or her own capacities. These capacities include expectation of success, performance anxiety, task value, and self-efficacy. The student evaluates his or her possibilities in any given learning situation; can he or she expect to be successful, is he or she anxious about the assignment at hand, how important is the task for him or her, and does he or she believe in his or her own capacity to manage it (Nevgi, Niemi, & Virtanen, 2003; Pintrich, 2000; Zimmerman, 2000). Performance anxiety refers to learners’ emotional reactions and disturbances. Anxiety may decrease cognitive capacity. Task value entails the student’s intrinsic interest and thoughts of usefulness regarding the course (Niemi et al., 2003). Self-efficacy refers to a person’s beliefs about how he or she can manage the tasks at hand (Bandura, 1986).

2.3.2 Strategies in learning

Strategies in learning encompass the students' practical means in studying. These strategies are time management, self-management, persistency, and help-seeking strategies. Learning strategies are the resource "engine" of the student and how he or she manages tasks. These resource management strategies assist learners in managing the environment and resources available such as time, effort, and other people. Self-management is considered the most important learning strategy (Niemi, Nevgi & Virtanen, 2003; Pintrich & McKeachie, 2000).

2.3.3 Cognitive and meta-cognitive learning skills

Cognitive and metacognitive skills refer to students' mental processes during studying. These skills are rehearsal, critical thinking, finding essential points, connecting newer and older knowledge, keywords and advance organizers, application of theories, and self-assessment. These strategies refer to learning techniques and observing one's own learning techniques and changing them if necessary. Learners utilize these strategies in the acquisition, storage, and retrieval of information. In the IQ Learn platform used in this study, they are called learning skills and include IQ tools to practice, develop, and observe learning skills. The aim of the tools is to support learners in becoming skillful in using these tools and in learning new skills to manage their learning (Niemi, et al. 2003).

2.4 What triggers self-regulation; the role of mediators

It is fruitful to study the role of mediation when scholars discuss how to support the development of learners' self-regulative skills in new digital settings.

Pintrich (1999, p. 469) states that self-regulatory strategies are not easily developed or learned and there must be instruction and scaffolding of these strategies. Dabbagh and Kitsantas (2005, p. 537) suggest that in the future, more attention should be given to scaffolds when studying self-regulation processes. Boekaerts and Cascallar (2006) ask what triggers or cues the self-regulation process. As motivation researchers, they emphasize students' personal experiences and emotions in the learning situation stating that motivation is a trigger for self-regulation. Furthermore, they discuss students' dependency on external regulation and mediation and state that teachers need to gain insight into students' changing self-regulation routines and the processes underlying these changes. According to them, this information is essential for teachers in order to determine how much external regulation and scaffolding is still necessary at a particular moment in time for an individual student or a group of students. (Boekaerts and Cascallar, 2006, pp. 199–210.)

Perry and Winne (2006, p. 211) argue that there is “warrant” for efforts to understand and promote students’ development of engagement in effective forms of self-regulation. The search for mediators in different learning situations and learning tasks is an important step when studying self-regulation according to Rheinberg, Vollmeyer, and Rollet (2000). They state, “by searching for mediators it is possible to gain sophisticated knowledge about learning motivation that is not trivial and already known” (Rheinberg, Vollmeyer, & Rollet, 2000, p. 523). Pintrich (1999) advocates the motivational issues of self-regulation and calls for the mediation of self-regulative strategies. In addition, Pea (2004, ss. 423–451) calls for analysis of *mediation* in the learning process.

2.5 Research on mediating self-regulation in technology-enhanced learning environments

2.5.1 Before the Internet era

Intervention programs aiming at supporting cognitive development or cognitive acceleration can be viewed as predecessors of research on how to mediate learning of self-regulation. During the 1990s, students’ mediation of cognitive development and metacognitive thinking were studied through interventions.

Computer-based programs in classroom settings included the Jasper series (Cognition and Technology Group at Vanderbilt, 1992) and the SMART project. The aim of the Jasper series (Cognition and Technology Group at Vanderbilt, 1992) was to create a technology-based program to motivate students to think and reason about complex problems. SMART was a further development with the aim to create a social environment providing support for metacognitive activities such as reflection, self-assessment, and revision (Vye, Schwartz, Bransford, Barron, & Zech, 1998).

The British Cognitive Acceleration in Science Education (CASE) program gave students special lessons aimed at developing their cognitive skills and metacognition in the context of science teaching (Adey & Shayer, 1994; Shayer, 1999). The project used Vygotsky’s (1978) thinking and took Feuerstein’s Instrumental Enrichment (IE) program as a model adapted for the CASE (Shayer, 1999; Feuerstein, Rand, Hoffman & Miller 1980). Corresponding cognitive acceleration programs were later developed in the Cognitive Acceleration through Mathematics Education (CAME) program (Adhami, Robertson, & Shayer, 2004) and the Cognitive Acceleration through Technology Education (CATE) program (Hamaker & Backwell, 2002).

Studies on self-regulation in local digital learning settings raised the issue of mediation in this new, important context. Although they did not use mediation or scaffolding terminology, Scardamalia, Bereiter and Lamon (1994) used the

idea of students' self-organized activity when they designed the Computer Supported Intentional Learning Environments (CSILE) project to support students in intentional, meaningful production of knowledge. They used Zimmerman and Schunk's (1989) ideas of self-regulated learning as a theoretical base. Latva-Karjanmaa evaluated open and distance learning (ODL) in Erasmus projects or the European universities between 1992–1995 by appointment of the European Commission. The Commission had encouraged the universities to include ODL in universities, however only 30 of 3500 Erasmus networks included some ODL in their activities (Latva-Karjanmaa and Auvinen, 1996).

2.5.2 The Internet era

In the late 1990s and 2000s studies on self-regulation in classroom settings advanced into research on self-regulation in online learning as the need for widening research in this area was observed by many researchers.

Supporting self-regulation in web-based learning

The extensive evaluation project presenting a European view of self-regulated learning in technology enhanced learning environments conducted by Carneiro, Lefrere, and Steffens (2007) concludes that there cannot be any certainty about whether media influences learning outcomes. The authors agree that in their respective countries there is a large number of publications on the topic of self-regulation, some publications ICT-based learning, but there are very few publications on self-regulation in technology enhanced learning environments. Their conclusion is therefore is that *in-depth research on the topic of self-regulation in technology enhanced learning environments is urgently needed*. Regarding the impact of technology enhanced learning environments on learning outcomes, they also emphasize that in recent years, a large number of empirical studies have been conducted. However their results are inconclusive. (Carneiro et al. 2007, pp. 177–178.) Carneiro et al. remark that asking if media influences learning outcomes is trivial question, and it is similar to the question of whether books enhance learning. They agree with Kozma's views according to which media can support learning and we should ask *in what ways media can support learning* (Kozma 1994, p. 7, 18; Carneiro et. al., 2007, p. 178). Furthermore, they argue that technology enhanced learning environments, which support self-regulated learning, are very likely "to transform the quality and reach of the learning experience" (Carneiro et. al., 2007, p. 178, citations in the original text).

Tools for self-regulation: Mediating or scaffolding self-regulation in the web

Dabbagh and Kitsantas (2005, 513–540) suggest that web-based pedagogical tools (WBPTs) can add another layer of complexity to learning that requires a higher demand for self-regulation. Referring to their own research (2004) as well as Kauffman (2002) and Niemi et al. (2003), Dabbagh and Kitsantas (2005, p. 515) state that teachers and course designers who are engaged in designing should pay considerable attention to mediating student self-regulation processes through the use of these tools in order to ensure academic success. Looking at research of the last decade, Dabbagh and Kitsantas (2005) note that WBPTs can scaffold the acquisition of metacognitive skills and strategic learning and they can also be used to engage students in complex tasks such as self-reflection, problem-solving, and social negotiation.

Winne et al. (2006, pp. 105–113) developed a course environment using gStudy. They studied fostering students' self-regulation through mediation provided by human tutors and non-human scaffolds using various kinds of contextual aids to examine different types of scaffolds provided by (adaptive) human tutors and (non-adaptive) non-human scaffolds. Azevedo et al. (2005, 381–412) developed a, think-aloud method to assess students' self-regulated learning processes as an online event in a hypermedia learning environment. McLaughlin (2002, pp. 155–156) describes a range of technological approaches to enable mediated learning that have been studied during the last decade such as Computer-Supported Intentional Learning Environments (CSILEs), Intelligent Tutoring Systems (ITSs), Goal-Based Scenarios (GBSs), and Design Support Environments (DSEs).

Human mediation of self-regulation

In the ATLAS project of Helsinki University of Technology between 10 European and US universities, Latva-Karjanmaa, Klus, Kairamo and Hamel noted that students need time and feedback from their online teacher (Latva-Karjanmaa, 2000).

The importance of human mediation in web-based learning has been raised by Azevedo and Hadwin (2005, pp. 367–379), Azevedo et al. (2005, 381–412), and Lajoie and Azevedo (2006). Azevedo et al. (2005) study fostering students' self-regulation provided by human tutors and non-human scaffolds. They highlight adaptive scaffolding, in which a human tutor makes an ongoing diagnosis of a student's progress in a web-based course and offers individualized support. Azevedo and Hadwin (2005, p. 376) review various scaffolds in web-based learning and observe the role of human instructors or tutors. They list some suggestions for the future development of mediation, such as designing specific computer-based scaffolds, developing pedagogical agents to diagnose

specific problems, and building adaptive support based on hierarchical priorities. Lajoie and Azevedo (2006, 803–821) note that technology-rich learning environments can provide a way to promote effective instruction, but suitable theory-driven design can be used to support teachers and learners.

Personalization of web-based learning

There is a call for personal ways to learn in the web according to Underwood and Banyard's (2011) review of facilitators and barriers to future development self-regulated learning in European context of technology enhanced learning environments. They observe that technology-based settings offer supportive environments encouraging self-regulation. However, they argue that providing students with adapted tools is not enough to make them self-regulated learners. They argue that this is because institutionally supported teaching is highly directed and leaves little room for *personal* ways to choose what to learn and how to learn (Underwood and Banyard, 2011, p. 160.).

Personal learning environments mediating self-regulated learning

Dabbagh and Kitsantas (2012, pp. 3–8) raise the issue of a personal learning environment (PLE) as a potentially promising pedagogical approach to integrate formal and informal learning using social media and supporting students' self-regulated learning in higher education contexts. They conceptualize the connection between PLE, social media, and self-regulated learning and provide a three-level pedagogical framework for using social media to create PLEs that support the students' self-regulated learning. However, even in the PLE environment, students need to have self-regulated skills *already at hand*. The model stresses the method of instruction as such, but it does not ask how to become a self-regulated learner. PLE research is a strong proponent of Internet Clouds and what they can offer learners; in this concept, students are given space in the "cloud" in which they can organize and obtain or store links to various knowledge sources (Wikipedia, etc.) and discussion channels (Facebook, Twitter, etc.). (Dabbagh and Kitsantas (2012.).

Aviram, Ronen, Somekh, Winer, & Sarid's (2008) iLearn research group studied self-regulated personalized learning (SRPL) and developed a pedagogical model called Intelligent Distributed Cognitive-based Open Learning System for Schools (iClass), which provides a novel perspective on online education SPRL places the individual learner at the center of the learning process and emphasizes the student's ability to tailor the learning process to his or her own interests, abilities, and needs while acknowledging differences among learners and teachers, school policies, cultural differences, and individual affiliations.

SPRL seem to be a step further than PLE in that it stresses the individual learner at the center of the learning process.

Tenno's (2011) research emphasizes the possibilities of personalization of one's own study path and the usability of the learning interface. Tenno studied the pedagogical infrastructure of e-learning by describing the most typical modes of actions used by student teachers in online environments and found the most suitable pedagogical structure of online environment for each learner profile. The research gave information on the kind of factors that should be paid attention to when building pedagogical infrastructures in an e-learning environment. Tenno requires personalization in working environments.

The quality of learning and self-regulation

Beishuizen highlights adaptability of complexity, interactivity, articulation, and balance as beneficial characteristics of European technology-enhanced learning environments. Their advantages are related to the possibility of creating authentic contexts that resemble real life and may foster students' intrinsic motivation to learn. Beishuizen concludes that teachers, learning tools, and appropriate assignments all help improve the quality of learning and self-regulation. However, he argues that further research is needed to study the quality of learning, self-regulation and learning outcomes. (Beishuizen, 2011, pp. 199–120). This study views this task as a call to analyze what kind of elements can affect the quality of learning self-regulation and views mediators as such elements.

2.5.3 Quality of learning and self-regulation, the future research tasks even from the aspect of mediation

"Further research is necessary to explore the relationship between quality of learning and self-regulation on the one hand and learning outcomes on the other." (Beishuizen, 2011, p. 120)

The previous overview shows that mediating self-regulation in web-based environments has advanced from providing self-study material into offering web-based, non-adaptive, and adaptive learning tools as mediating support. During recent years, web-based environments have advanced into offering interactive elements and developing into joint learning processes or knowledge creation in social media. They are also offering personal learning environments in which students can monitor and choose their personal learning paths.

All these developments have advanced students' self-regulative skills and strategies. Nevertheless, Beishuizen (2011) called for research on the *quality of learning and self-regulation*. In this study, this is understood to mean that the quality of learning process should be studied. Studies on web-based settings held

largely to the concept of self-regulation. However, this area could benefit from elaborating on the concept of mediation in order to see *what mediators have to offer* in empowering learning support.

This study observes the following:

- Focus has been given to the cognitive- and knowledge-intensive elaborated learning content and elaborated tools aiming at producing certain learning outcomes;
- More attention can be devoted to the quality of the learning process; and
- Studying mediation and mediators is one way to conceptualize the learning process, at least when the perspective is on what supports or promotes students during the learning process.

Beshuizen (2011) raises the issue of the quality of learning and self-regulation in online studies. This study views that the concepts of mediation can offer a conceptual tool for analyzing the quality of learning, in particular, when studying the experiences of students in a web-based course aiming at advancing the self-regulative skills and strategies of the students. This study is directed towards students' experiences of the learning environment and its mediators from the point of mediation and not from the point of learning "input" or the outcome. The study examines what a virtual environment means for mediators as a whole and the dimensions of learning support, which are called mediation in the study.

The study also explores students' experiences of mediators through their own voices. It seems that a *knowledge gap* exists when it comes to the relation between learners and web-based pedagogical tools, although well-elaborated adaptable and interactive tools can be regarded as mediators or scaffolds. Upon observing Beshuizen's (2011) critique, one can ask what kinds of elements support the quality of learning self-regulation. Focusing on how students experience learning support, here called mediation, the study investigates what kinds of mediators support web-based learning of self-regulation.

Base on the review concerning research on self-regulation in web-based learning environments it can be concluded that there is a need to explore how students experience *support measures such as web-based pedagogical tools or entire learning environments*, which are regarded as web-based mediators in this study. As presented in the review of this study there are many tools aiming at improving self-regulation. The empirical portion of this study examines students' *own voices and experiences* concerning learning support, when studying with the IQ Learn learning tool during a web-based course on self-regulation.

2.6 The web-based IQ Learn platform for developing self-regulation

2.6.1 The case of mediating self-regulation in Finnish higher education

The IQ Form project created an interactive, web-based tool called “IQ Learn” to support learners’ self-regulation in virtual universities and other higher education settings (Niemi, 2002). The name “IQ Form” refers to the idea that technological learning environments and platforms should be “intelligent” in supporting students and adapting to students’ needs. IQ Form was developed for the FVU, Finnish universities, and universities of applied sciences (also called polytechnics). The services have been offered in Finnish, English, and Swedish. The environment has also been used by teachers who wanted to add a course of learning as an addition to their regular course. The IQ Learn system allows a teacher to invite a group of students to use the platform for their self-regulation studies.

The IQ Learn research team created a three-part test set aiming at mapping the sub-components of self-regulation presented in Chapter 2.3, students’ forethought, learning strategies, and learning skills. The latter were based on the Motivated Strategies for Learning Questionnaire (MSLQ) by Pintrich, Garcia, McKeachie and Smith (1993, 801–813). Its new version was developed for a vocational higher education context (Ruohotie & Nokelainen, 2000, 141–193). The IQ Research group modified this version for university settings (Niemi, 2002, 15–22). The tests were validated for university students through factor analysis (Nevgi, 2001, 203–219, 2002, 207–232; Tirri & Komulainen, 2002, 146–176). In an article about the IQ Learn pilot project, Niemi et al. (2003, 47–71) state that self-regulation tutoring is greatly needed in higher education. There is too little guidance for study skills and learning strategies in campus-based and virtual studies. The initial study on the project indicated that students in higher education differ in their self-regulation and receive little or no tutoring for their learning skills. According to the pilot studies, the IQ Learn tool is most useful for students who have difficulty learning, do not have stable learning strategies and skills, or are at an early stage of their university studies. Developing one’s action towards self-regulative learning is a long and demanding process, and not many higher education students get through it alone. A technological tool such as IQ Learn can enhance learning, especially at the beginning of this process. Niemi et al. (2003).

2.6.2 The IQ Learn tools and their functions in this study

The main goals of the IQ Learn tools are identifying different learners' needs in virtual learning environments using its variety of self-assessment tests and developing new tutoring methods and support for learners to empower them through self-awareness, self-regulation, and collaboration in virtual environments. IQ Learn includes three kinds of tools to support learners in the learning process: the test bank, the tutoring package, and the diary. Table 2 summarizes the functions of the IQ Learn tools.

The IQ Learn test bank questionnaires give students information about their strengths and motivational strategies for self-assessment. After completing the tests, students can self-evaluate their strengths and motivational qualities; these results are provided in both tables with numeric values and graphic profiles based on the test results. Students can save their test profiles in their personal IQ Learn diaries, which are offered by IQ Learn, to create their own remarks on their learning processes. They may share these reflections on learning in a virtual community with their peers and teachers. Students may also reflect on their reactions. The IQ Learn tutoring package includes several items or tasks that help students increase their learning capacity. The tutoring package also includes suggestions for practical learning tasks that teachers can use as assignments. These tools can be used to aid students' self-assessment and give them information about their motivational learning strategies. Students can complete the tests at the beginning of their studies and save the results in their electronic diaries, which are available on the IQ Learn website. Students can find more information and help from a tutorial package (tutorial), which is located on the IQ Learn website. They can express their thoughts or complete the exercises suggested in the IQ Learn tutorial in the IQ Learn diary.

Table 2. The IQ Learn tools and their functions.

IQ LEARN TEST BANK	IQ LEARN TUTORING PACKAGE (TUTORIAL)	IQ LEARN DIARY
Students' self-assessment tests give students profiles on: <ul style="list-style-type: none">- learning strengths- learning motivation- learning strategies- learning skills	<ul style="list-style-type: none">- tailored instructions for students on how to develop their qualities as learners- guidelines for virtual teachers/tutors on how to support students in becoming active and self-regulated learners	In the personal diary, students can: <ul style="list-style-type: none">- save their profiles built by the IQ Learn tests describing their learning strengths and motivational structure- reflect on the progress of their studies and the development of their learning skills- send assignments to the teacher

(Based on Niemi, 2002 pp. 1–36; Nevgi, 2002, pp. 197–220; and Latva-Karjanmaa, 2002, p. 138.)

The IQ Learn test bank motivates students to think about themselves as learners. Although the test results are based on self-assessment, they can give students directions about what kind of learner they are. The test set includes four tests: (1) the student's strengths as a learner based on Gardner's multiple intelligence test; (2) how motivated the student is; (3) what kind of learning strategies the student uses; and (4) what kind of learning skills the student possesses.

In the empirical part of this study, students are asked to complete the tests in order to make them think about themselves as learners, their strengths, their learning skills, and their learning strategies; the tests also increase their curiosity about the help available to improve their various capacities. The following figure illustrates the questionnaire used to test students' motivation (Figure 1).

The screenshot shows a web interface for a questionnaire. At the top, there is a navigation bar with four tabs: "Guide for working together", "Tests", "Diary", and "My Groups". The "Tests" tab is currently selected. Below the navigation bar, the questionnaire content is displayed within a dashed border. It contains four statements, each followed by a five-point Likert scale from "Disagree" to "Agree". The statements are:

- "If I can choose the assignments or literature, I choose the ones from which I can learn new things, even though I may not then get the best grade." (A question mark icon is visible in the top right corner of the statement box.)
- "I am very anxious in exams."
- "I believe that my studies in the university/college will benefit me later."
- "Noticing that an exam includes tasks I cannot answer affects (disturbs) my concentration on the other tasks."

At the bottom of the questionnaire area, there is a "Next page" button and a progress indicator showing "Questions left 16 (Learning motivation)".

Figure 1. An example of the IQ Learn questionnaire from the IQ Learn webpage.

After the test results, the IQ Learn system offers students exercises from the IQ Learn tutoring package depending on their test results. Figure 2 shows a student's test result in motivation with the bright suns. The student had low score (1.75/5) in coping with test anxiety. Below the figure is a table showing the numeric values of the test. By clicking the hyperlink on the table (B. Coping for tests anxiety) the student gets into the tutorial, which gives advice how to cope with test anxiety.

Figure 2. An example of IQ Learn test results.

Note: A students' motivation test result in IQ Learn has four parts: expectation of success, coping with anxiety, meaning of studies, and self-efficacy and self-confidence.

The IQ Learn tutorial offers tools to develop learning skills and strategies with various advice, links, and exercises (Figure 3). The student who scored low in coping with test anxiety, can complete exercises on how to lessen anxiety in the tutorial.

[Learning motivation](#)

[Expectations of success](#)

[Self-efficacy and self-confidence](#)

[Coping with test anxiety](#)

[Meaning of studies](#)

[Learning strategies](#)

[Learning skills](#)

[Strengths](#)

for student | [for teacher](#)

Coping with test anxiety

If you filled in the test called **Learning motivation** are you satisfied with the result? Do you become distressed in stressful study situations? You can reduce anxiety by learning to work in a new way.

Topics to think about:

- Plan your schedule so that you have time to do everything you want to do. If you feel that there is not enough time, decide which things are most important in your life at a particular moment.
- In your learning portfolio diary, write your plan about how you are going to act at the beginning of the course so that you do not feel distressed.

Do you always put off preparing for an exam and leave assignments to the last minute?

- Undone work and rescheduling them burn up more energy than doing them.
- Preparing a study plan and sticking to it reduces anxiety.
- Time and work management become easier when you are aware of what you must do at a certain time.

Sometimes anxiety is attached to the fear of failure and the sense of shame caused by failure. You put off beginning your work so as not to sacrifice time and strength if there is any chance of failing. Failure is much easier to explain to oneself if one has not sacrificed much time and effort in preparation. This is called a defense strategy.

- Do not be afraid of doing something that could turn out to be a mistake.
- One mistake can teach you much more than many successful performances.

Figure 3. IQ Learn tutorial offering exercises for coping with test anxiety.

The IQ Learn Diary offers a space for self-reflection and storage of task assignments. In the diary, students can reflect on the progress of their studies and the development of their learning skills. In this study, students use the diary to write down their self-reflective assignments. The diary also serves as storage; diary input is saved chronologically for later use. Students can send assignments directly to the online teacher/tutor through the diary.

2.6.3 The human dimension of the IQ Learn tutorial

The online course based on IQ Learn did not have a teacher in a real sense, since the online teacher was only present at two face-to-face information sessions prior to the course. The online teacher gave the assignments weekly and thanked for receiving the completed assignments from the students. She also encouraged the students to go on with the course. However, the human dimension of IQ Learn was to some extent embedded in the IQ Learn tutorial tool. It was written in casual, friendly tone and included practical advice in everyday language. The tutorial offered students choices among exercises and links, as could be shown in the previous figure (Figure 3) and is also shown in the following excerpt from the IQ Learn tutorial (Figure 4). This text is an example of advice and exercises offered to students who received low scores in seeking help from others on the IQ Learn test.

for student | [for teacher](#)

Help-seeking strategies

If you filled in the test called **Learning strategies** are you satisfied with the result? Do you think that you can make it without help from others? You can reach better study results by discussing with others.

Topics to think about:

- In your learning diary, record your experiences related to seeking help from fellow students, tutors and teachers.
- How do you feel if somebody asks you for help?

How should you seek help?

You must recognize your need for help before you can seek help. You must admit your own incapability and find a person whom you can trust enough to be able to ask for his/her help. A student should be able to estimate when and how s/he should seek and use help. Even if guidance is offered, nobody knows when you need help and what kind of questions you need answers to. Taking ones own responsibility is important here as well. You can get an answer to your question:

- from the frequently-asked questions link on the pages of your course,
- from the other students on the course,
- from the tutor of the course, and
- from the teacher.

from the address <http://www.opintoluotsi.fi/english/> you find information about the complete range of studies available in Finland.

Use the help offered!

There are reliable research results that indicate, for example, that the help and direction students give each other lead to achieving good study results.

Figure 4. IQ Learn tutorial: Advice and exercises for students scored low in help seeking.

2.6.4 How can IQ Learn act as a mediator of self-regulation?

This study investigates mediation as learning support in the context of IQ Learn. The main concern of the research is how IQ Learn acts as a mediator of learning support when used together with an online teacher. The interest lies in analyzing students' experiences of the IQ Learn tools in their learning process when used with an online teacher. In the IQ Form project, empowerment is seen to enable learners (Niemi, 2000, pp. 8–9), which is also the main aim of mediation according to Feuerstein (1991). The IQ Form project defines empowerment in virtual learning environments as follows:

Empowerment in virtual learning spaces means mediation and reciprocal relationships between learners and technology-based environments that is intended to increase the learners' ability to gain understanding and control over personal, social, and learning environmental force, in order to take action to improve their individual and collaborative learning opportunities. (Niemi, 2000, p. 11)

Empowerment aims to improve learning opportunities with interactive means in the surrounding environment. This idea comes very close to the view of learning in Feuerstein's (1991) and Vygotsky's (1978) theories of mediated learning. They both view learning as a never-ending process, in which the key is improving the human learning potential. The emphasis in both theories is in the acknowledgement of mediation's role in the surrounding sociocultural environment in the learning process.

3 KEY ASPECTS OF MEDIATION IN LEARNING BASED ON VYGOTSKY AND FEUERSTEIN

3.1 The arguments for choosing Vygotsky's and Feuerstein's theories

Theoretical definitions are needed on how mediation works and how the elements of functional mediation are applied to web-based learning. This chapter explores Vygotsky's (1978) and Feuerstein's (1990, 1991) ideas of mediation, reflects on the challenges of web-based learning, and creates an integrated view of mediators in learning. Feuerstein's (1990, 1991) and Vygotsky's (1978) theories of learning share ideas about the role of mediation in learning and explore the primary problem of how humans learn. They both view mediation as the main constructive element of learning.

- The first chapter, which focuses on Vygotsky's (1978) views, describes the function of mediation as a promoter of higher mental processes.
- The second chapter analyzes the elements of qualitatively good mediation based on Feuerstein (1990, 1991).
- The third chapter presents an integrated view of the key aspects of mediated learning.

Arguments for choosing Vygotsky's and Feuerstein's theories

According to Sternberg and Grikorenko (2002), Kozulin (2003), and Shayer (1999, 2003) Vygotsky (1978) and Feuerstein (1979, 1980, 1990, 1991) both introduced groundbreaking thoughts on learning to learning research. The shared views of Vygotsky and Feuerstein can be summarized as follows.

- They both had Piaget's (1955/1926) theory as a main target of critique.
- They both view human intellect as dynamic and not fixed, thus making humans continuously developing beings.
- They have, according to Sternberg and Grikorenko (2002, vii, viii, 47–48, 37–39), initiated and developed dynamic intelligence testing.
- Their research was strongly influenced by their work with children in deprived learning environments. Vygotsky worked with a large number of immigrant orphans and children in the first years of the Soviet Union, and Feuerstein worked with children and refugees in World War II concentration camps.

Some studies have used Feuerstein's (1990, 1991) and Vygotsky's (1978) theories while dealing with mediated learning issues (Palincsar & Brown, 1984; Adey & Shayer, 1994; Lidz, 1987, 1991, 1995; Tzuriel, 1990; Kozulin, 1990, 1992, 2001). Kozulin (2001) brings forth similarities between Feuerstein's and Vygotsky's theories. According to him, the modern trend in instruction and learning theories, to which Vygotsky's and Feuerstein's approaches belong, places emphasis on the constructive activity of the student, the cognitive-developmental suitability of the material, and the involvement of the teacher in the design and implementation of classroom activities above and beyond the mere provision of information.

In addition, this study maintains the following:

- It was mainly Vygotsky's (1978) and Feuerstein's (1990, 1991) research on learning that brought forth the aspect of mediation on a theoretical and implementation level.
- Feuerstein's (1990, 1991) and Vygotsky's (1978) theories offer tools to analyze and conceptualize mediation in new technology-based environments since their research emphasizes mediation with various tools and human interaction.

3.2 Learning as a mediated activity, according to Vygotsky

3.2.1 Mediation as the most central factor of human learning

Vygotsky views mediation as the central process of learning and human development and proposes that higher mental processes can be viewed as functions of mediated activity (Vygotsky, 1978, pp. 54-55; Vygotsky & Luria, 1994). Vygotsky (1978) took up the concept of mediation (*Vermittlung*) from Hegel, who saw it as the most characteristic feature of human reason. According to Hegel (1969, p. 68), nothing is simply and immediately present. Vygotsky (1978) mostly uses the concept of mediated activity instead of mediation; because of the centrality of the theory of activity in his thinking. Mediation takes place via three major classes of mediators: material tools, psychological tools, and other human beings (Vygotsky, 1978; Vygotsky & Luria, 1994, pp. 99-174; Kozulin, 1990, pp. 111-121; Kozulin, 1998, pp. 62-64).

Vygotsky's (1978) theory is multi-layered and can be approached from different angles. His theory has been thoroughly explored by many researchers, including Kozulin (1998, 1990), Cole (1996), Wertsch (1985), and Säljö (2000). Wertsch (1985, p. 15) states that Vygotsky made his most important and unique contribution with the concept of mediation. Säljö (2000) orients much of his studies to the analysis of artifacts or tools in learning based on Vygotsky and

highlights the role of mediation. A large research area has developed around Vygotsky's view on activity. Human development and culture are studied through activity as a unit of analysis in activity theory initiated by Leontjev (1978) and developed further by Cole and Engeström (1998, pp. 1–5). In an area that Cole and Engeström (1998) call cultural psychology, they mention other units of analysis, approaches, and entry points, such as mediated action, in the works of Wertsch, Del Rio, and Alvarez (1995) and situated learning in which communities of practice are units of analysis in the works of Lave & Wenger (1991). Rogoff (1995) views mediation through the context of participation in sociocultural activities involving engagement in learning, in communities and institutional settings, in interpersonal interaction with others, and through personal participation and reflection.

The translators and editors of Vygotsky's text discuss the lack of detailed references in those texts, the difficulty of tracking the original texts, and sorting out repetitive text passages, which commonly occurred due to his illness in his last years. This study uses two main sources: Vygotsky's (1978) *Mind in Society* and Van der Veer & Valsiner's (1994) *Vygotsky Reader*, which includes original texts by Vygotsky. Cole points out that *Mind and Society* (Vygotsky, 1978), which is edited by Cole, John-Steiner, Scribner, and Souberman, is not a literal translation but rather an edited translation of Vygotsky's texts. The editors' preface clarifies that it includes several essays, and the first four chapters include an edited version of Vygotsky's *Tool and Symbol in Children's Development* (1930) based on the rough translation provided to the editors by Luria. The fifth chapter includes a summary of the main theoretical and methodological points made of *Tool and Symbol in Children's Development*. The fifth chapter was taken from section 3 of *The History of the Development of Higher Psychological Functions* (1960), which, as the editors point out, showed that Vygotsky's work reaches considerable further than *Tool and Symbol in Children's Development*. In their mind it controverts the impression of Vygotsky as an early neobehaviorist of cognitive development. (Vygotsky, 1978, p. ix). In this study also the later published original translation of "Tool and Symbol in Child Development" (this title uses Child instead of Children in Cole et al. 1978 *Mind in Society*), co-authored by Vygotsky and Luria is used for a broader understanding. Luria gave this translation to Cole and it was published in the *Vygotsky Reader* by Van der Veer & Valsiner (Vygotsky & Luria, 1994, pp. 99–174). However, this study, uses both the edited (1978) and version and the original Vygotsky and Luria text (1994, pp. 99–174) as the main sources of Vygotsky's texts. Kozulin (1990) and Wertsch (1985), who are also referred to in this study, have been able to use the original Russian text of the articles as well as many other original texts by Vygotsky and his colleagues, including original

Russian texts such as “Problema periodizatsii etapov v detskom vozraste (The problem of stage periodization in child development)” (Vygotsky, 1972).

3.2.2 Mediated activity generating cognitive processes

When looking at learning based on Vygotsky (1978), an emphasis on activity comes into focus. Vygotsky's (1978) main idea is that mediation supports learners' cognitive activities. Vygotsky (1978) states that the mediated activity of tool use in social interaction through speech originates the development of higher mental processes. He goes on to state, *“the most significant moment in the course of intellectual development, which gives birth to the purely human forms of practical and abstract intelligence, occurs when speech and practical activity, two previously completely different lines of development, converge.”* (Vygotsky, 1978, p. 24, italics in the original text).

Vygotsky (1978) introduces the concepts of lower and higher mental processes. The former is practical intelligence including the simple use of material tools, and the latter takes place as a sociocultural process that produces more advanced and symbolic tools developed by humans. He strongly emphasizes the role of sociocultural mediation in human development. According to Vygotsky (1978), the sources of mediated learning are tools, symbols, and social interaction. The activity that is generative for higher mental processes is socially meaningful mediation along with elaborated tools (e.g., symbolic). Vygotsky separates practical intelligence that occurs with the use of physical tools from higher mental processes. Higher mental processes demand a higher order of tools, which he calls symbolic or psychological tools. A cumulative change and a clear qualitative change occur in learning content when the learner is involved in higher mental processes (Vygotsky, 1978, p. 57). Some researchers state that Vygotsky did not give the human mind itself much appreciation. He nevertheless speaks about the process of transformation. Clearly, this transformative element cannot be explained in a simplistic way. According to Vygotsky (1978), every function in cultural development appears twice: first on the social level and later on the individual level, or first inter-psychologically between people and then intra-psychologically inside the child. This applies equally to voluntary attention, logical memory, and the formulation of concepts. All higher functions originate as actual relations between human individuals (Vygotsky, 1978, p. 57). Kozulin (1990, 112–114), who used Vygotsky's original Russian text *Istoriya Razvitiya o Istoriya razvitija vyschih psikhicheskikh funkciy*, observes that according to Vygotsky there is a clear distinction between elementary and higher mental processes and that the processes of development of higher mental functions have still not been identified (Vygotsky, 1983).

The development of higher mental functions includes:

“...two main branches, or two streams in the development of the higher forms of behavior... The first group consists of the processes of mastering the external means of cultural development and cognition, e.g. language, writing, counting and drawing. The second group [includes] the processes of the development of higher mental functions, which so far have failed to be precisely identified and defined, and which will still pass traditionally under such names as selective attention, logical memory, concept formation, etc. These two groups of processes, taken together, represent what we are calling the processes of the development of higher mental functions. (Vygotsky, 1983, p. 24, cited in Kozulin, 1990, 113).

This study interprets this citation as: Human mind can process things, while it is not a “copycat” of socio-cultural reality.

The zone of proximal development in learning. Learning creates a zone of proximal development (ZPD) that results in mental development and sets in motion a variety of developmental processes that would be impossible without learning. Vygotsky (1978) identified two levels of development: the actual developmental level, in which mental functions are established already, and the proximal level, which defines those functions that are not matured yet but are in the process of maturation. He claimed that what can be done on one’s own is not indicative of mental development. The interesting aspect is what can be done with the assistance of others (Vygotsky, 1978, pp. 84–91).

3.2.3 Tool, sign, and social mediators

According to Vygotsky (1978), learning is a mediated activity with tools, signs, and social interaction that takes place in a zone of proximal development in which the learner becomes aware of what he or she can reach.

Mediation takes place via social, symbolic, or tool mediators. It can be analyzed through its agents, i.e., mediators. Humans learn by mediated activity, by using material or symbolic tools, and through social mediation with other human beings. Vygotsky’s theory stresses the roles of tools created by human culture and used in social settings. The tools can be physical, mental, psychological, or symbolic. Vygotsky (1978) views the roles of physical tools as supporting lower mental functions and psychological tools as creating higher mental functions, such as thinking and cognitive processes.

Vygotsky claims that,

The most essential feature distinguishing the psychological tool from the technical tool is that it directs the mind and behavior whereas the technical tool, which is also inserted as an intermediate link between human activity

and the external object, is directed toward producing one or another set of changes in the object itself. (Vygotsky, 1981b, p. 140)

Tool mediators. Human beings are in constant contact with tools that mediate for humans, including material or symbolic (psychological) tools. These tools work in the learning process as mediators (Vygotsky, 1978). Vygotsky extended the idea of physical tools as mediators of learning to psychological tools or mental tools. This study chooses to investigate mediators through two main categories: human and tool mediators. However, it must be observed that Vygotsky (1981b, p. 140) saw a difference between what he called psychological tools and technical tools; he claimed that psychological tools direct the mind and technical tools direct the objects at hand. This means that psychological tools have a more immediate impact on human mental processes than technical tools. However, technical tools developed in late modern society involve many “semiotic messages” and intellectual features, which make them more than simple tools made for repetitive, non-intellectual use. *Advanced technical tools are also psychological tools* that intrigue the human brain on many levels and transform mental activities in one way or another.

Mediated activity with “psychological tools” is at the core of mediation. To Vygotsky (1978), mediation is above all about creating mental activities that constantly transform the human mental structure. Vygotsky’s clarification of what differentiates a practical or elementary mental observation and process from a higher mental function is still very efficient. Simple tool use is often only repetition that does not involve intellectual transformation of the tool or the human mental structure. Vygotsky and his student Luria (1994, pp. 138–141) discuss in detail the birth of higher mental functions and claim that they are not a direct continuation, perfecting, or corresponding elementary function. Instead, they presume a new radical direction with more progressive symbolic tool use. They give an example of the development of quantitative operations. In the beginning, these quantitative operations are limited to the immediate perception of pluralities and groups, and a child can perceive quantities but cannot calculate them. Later, the child uses auxiliary processes to break down this immediate form of observing, and it is replaced by a different process: the use of indirect auxiliary signs and symbolic tools such as speech or fingers in the process of counting. Later, the counting operation is again connected with a radical reconstruction during calculation with complex calculation systems (e.g., multiplication, author’s example), which form a new specific psychological formation. The same issue is expanded on in the edited version of Vygotsky’s texts by Cole et al. (1978, pp. 24–30) but not in as much detail.

The core of Vygotsky’s (1978) and Vygotsky’s and Luria’s (1994) texts is that development does not follow a linear and consequent line; instead, it is affected by chains of transformation releasing each other. It is important to understand

the radical difference of immediate tool use and psychological transformation via tool use. The former is almost mechanical, and the human being does not add his or her own psychological transformation to the tool use; the latter tool use is a constant evolutionary process in the human mind.

Human mediators. In Vygotsky's (1978) perspective, learning is not just transmission of data. The learning process involves active interaction of the human being with the surrounding sociocultural environment. It is clear that Vygotsky sees mediation as, above all, a social activity that is highly dependent on human interaction. According to Vygotsky (1978), the development of human activities acquires meaning of their own in a system of social behavior and the path from object to human and back to object passes through another person. This human developmental process is deeply rooted in the links between individuals and social systems (Vygotsky, 1978, pp. 24–30). Human beings learn tool use and the meaning of various artifacts in contact with other humans.

Vygotsky (1978) criticizes the view that human beings' mental and psychological processes can be studied independently from the environment. The more sophisticated or symbol-like tools become, the more their meaning is learned in human communication. This view is different from that of Piaget (1995/1926). Vygotsky's critique addresses the Piagetian view of pre-existing intelligence/fixed schemata, which are in existence prior to the learning process in a child (Vygotsky, 1978, p. 45; Vygotsky & Luria, 1994).

3.2.4 Review of Vygotsky for the purposes of this study

Remarks on Vygotsky's concept of mediation. Kozulin (2003, p. 23) observes that a common classification of mediated interaction is missing. Wertsch and Stone analyze Vygotsky's ideas further studying human mediation (1985, pp. 162–179) and argue that in an interactive situation, with more advanced semiotic symbols, children become more involved in complex activities. They remark that the emerging control of external sign forms involves "mastery of socially defined activity through coming to appreciate the full significance of the signs one uses in social interaction" (Wertsch & Stone, 1985, 177). Human mediation in Vygotskian wording is presented by Tharp and Gallimore (1988, p. 31) in the context of education, and they define teaching as assisted performance. Assisted performance refers to what a learner can do with help.

Wertsch (1998) calls for further research on inter- and intra-psychological processes. He argues that Vygotsky does not reduce intellectual development as being solely dependent on mediation with tools and symbols or as a sociocultural process. Wertsch (1998, p. 110) notes that in Vygotsky's perspective, intra-mental functioning is social not only in the sense that it is sociocultural situated but also in the sense that it preserves the functions of social interaction. Wertsch (1998, p. 110) observes that in Vygotsky's formulation the inter-mental and

intra-mental planes, they are inherently related and his emphasis was on the transformations between inter-mental and intra-mental processes rather than on the gulf that separates them.

Minick (1997, p. 121) notes that Vygotsky tried to establish conceptual links between mind and behavior. He concludes that many recent studies of the Vygotskian school (Davydov & Radzikhovskii, 1985; Zinchenko, 1995) have begun to re-conceptualize the relationship with mind and activity (1997, pp. 124–125). Minick maintains that the new theories allow avoiding conceptual isolation between systems of social activity and psychological characteristics, avoiding reductionism from some cultural theorists on certain aspects of psychological development as simply transferring cultural values, and avoiding the tendency of some “social behaviorists” to characterize the development of human social activities without referencing mental processes (1997, 125).

Leontjev (1981) makes an important point about Vygotsky’s theory in relation to mediation. Vygotsky identified two main interconnected features of activity that are fundamental and necessary for psychology: (1) its tool-like or “instrumental” structure and (2) its inclusion in a system of interrelations with other people. These features define the nature of human psychological processes as the tools mediate activity and the mental processes (their “higher psychological functions”) acquire a structure. This structure is necessarily tied to the socio-historically formed means and methods transmitted to them by other human beings in the process of cooperative labor and social interaction. (Leontjev, 1981, p. 56.)

Säljö (2000) writes about the evolution of the idea that tools bringing more understanding about mediation. Leaning on Vygotsky, he states that a human being is not in direct, immediate, unmediated contact with the world but that physical, intellectual, and linguistic tools mediate the world for human beings. We deal with the world with the help of tools, which are an integrated part of the social practice of mind (Säljö, 2000, p. 81). Säljö (1997) has earlier noted that humans and tools co-evolve in the learning process and through the human history.

Though mediation is a phenomena present in almost all situations of human life in semiotic meaning, its presence in a learning situation is particular and needs particular attention.

This study focuses on virtual tools. It can be argued that *the difference between material and psychological tools is sometimes vague*, and it seems that the concept of tools is evolving. For example, co-produced thoughts in any virtual work or learning settings are psychological and material. While thoughts can become materialized as textual presentations; they can evolve constantly through joint writing processes by students.

The mind cannot be separated from the tools. With new technological tools, there is an obvious need to link material tools with psychological tools. Vygotsky (1981b) saw them as quite separate, and stated that material tools aim to repeat activities done by other humans whereas psychological tools can transform human thinking processes and direct the mind (see also Tella & Mononen, 1998). Tella and Mononen (1998, 112) analyze Vygotsky's ideas and observe that "we are starting to explore a new "technology", one which unites the material with the psychological, an 'informational technology' that in the emerging community of the World Wide Web is providing a new means of mediating our activities." Drawing from Smagorinsky, they highlight the unlimited character of the mind. They state that the development of the mind cannot be separated from tools and that "the mind is unlimited in the sense that its development is inseparable from the tools of mediation" (Smagorinsky 1995, 197, as cited in Tella & Mononen, 1998, p. 112).

Many lines of thought have been built on Vygotsky's theories, and it is not possible to analyze their differences in this study. The view of Wertsch (1998)—of avoiding a dichotomy between the socially given and mentally constructed—is also adopted here. Vygotsky (1978) highlighted learning as the mediated activity of tool use and social mediators. Leontjev (1981) stressed that the two interconnected features of activity are tool mediated and transmitted by other human beings, which are called human mediators in this study.

Educational interventions based on Vygotsky's theory. Since the 1990s, Vygotsky's theory has also been used to investigate learning in technology-based learning environments. As mentioned previously, prior to the Internet era, Vygotsky's (1978) theory of mediation was used in educational interventions by Brown (1985), Adey et al. (1980), Shayer (1997), and the Jasper series (1992).

Mediation viewed through the trialogical learning process and jointly produced knowledge. Paavola and Hakkarainen (2009, pp. 83–92) present a trialogical learning process model and base their thinking on Vygotsky's ideas of mediation using tools, signs, and semiotic mediation from Peirce (1998). They argue that meaning making with dialogue (e.g., Sfard's participatory metaphor [1998]) should be supplemented with approaches emphasizing joint work. They demonstrate an object-centered, trialogical approach to computer-based collaborative learning while considering a dialogical approach to learning and emphasizing joint work with artifacts and practices. According to Paavola and Hakkarainen (2009), the concept of trialogue is closely related to mediation.

3.2.5 Using Vygotsky's theory for web-based learning: key aspects

This study finds the following aspects of Vygotsky's (1978) theory valuable when studying mediation in web-based learning.

- Learning is a mediated activity and is particularly mediated in web-based studies where learning mainly takes place via Internet-based learning tools and social communication systems. Tools can have a strong role in learning where environments can, for example, provide new kinds of tailor-made adaptive technologies. Vygotsky could not be aware of the rapid development of virtual learning tools as humans' new symbolic systems developed over the last two decades. Nevertheless, his strong concentration on *mediation as a bridging actor in the learning process* is a powerful tool for analyzing learning in technology-based settings.
- Human mediation has an important role in mediated learning, and Vygotsky (1978) emphasizes that *mediation is born in interaction with social reality*. However, clarification is required about what helps human learners in web-based learning situations in practical terms while the physical presence of other human beings is often limited.
- Tool mediation can be used efficiently in web-based learning, and the tools used in this study (IQ Learn tests, tutorial, and diary) help learners develop their own learning strategies and skills. The tools assist learners' mental development and produce new understandings about how to study better. Although Vygotsky differentiated between material and symbolic tools, *the technology-based learning environment has tool and psychological characteristics*. Subsequently, the concept of a tool refers to all the mediators produced by human beings that are external to learners and presented to them through a learning environment: the learning environment, symbolic icons or concepts, computer-based courses, texts, test sets, etc.
- Mediators promote thinking and higher mental functions, i.e., cognitive and metacognitive processes. This study looks for mediators in these processes in a web-based course on self-regulation.

3.3 The role of mediators in learning according to Feuerstein

3.3.1 Looking for quality of mediation in the learning process

Certain qualities of mediation are a necessary part of well-mediated learning according to Feuerstein (1991). The parameters for quality in mediation are goal setting, reciprocity, transfer, and meaningfulness. He stresses that the goals of any learning situation should be clarified to the learner, there should be mutual interaction between the learner and the mediator (reciprocity), study tasks should be tied to something previously learned, and learners should experience learning as a meaningful activity. The starting point of Feuerstein's thinking is that all humans can learn better when receiving sufficient mediation for their learning. He observed this while studying children and youth in deprived milieus such as post-war camps and other situations where living and learning conditions were poor. Feuerstein (1991) states that the unique effect of mediation is that it creates a willingness to learn in the learner.

3.3.2 Modifiability of cognitive functions through mediated learning experiences

In his structural cognitive modifiability (SCM) theory, Feuerstein (1990) argues that the human being can develop his or her cognitive capacities continuously. Mediation is the means for developing these capacities. The development of individual capacities takes place through mediated learning. The cornerstone of mediated learning is the mediated learning experience (MLE), which is (described) as a breakthrough in the theory of cognitive development (Feuerstein & Feuerstein, 1991, pp. 3–19). The essence of Feuerstein's theory is that in order to learn well, students need to have MLEs. MLEs seem to arise from high-quality interactions between the mediator (parent, teacher, etc.) and the mediatee (child, student, etc.), which supports the development of cognitive modifiability and cognitive structures of the individuals. An MLE is the building block of structural cognitive modifiability. MLEs are products of a unique quality of interaction during which the human organism is subject to the intervention of a mediator. (Feuerstein & Feuerstein, 1991, pp. 3–19).

Feuerstein (1990) views intelligence as a process, which means that intelligence is adaptive. The modifiability of individuals varies greatly, which Feuerstein (1990, p. 74) explains as the consequence of mediated interactions that make mental schemata plastic and modifiable. Consequently, mediation is the key to modifiability of human intellect. In his analysis of human intelligence, Feuerstein (1990, pp. 70–71) supports Sternberg's (1985) observations that intelligence is the faculty by which the organism adapts to novel situations and Gardner's (1985) multifaceted theory of intelligence. Feuerstein and his

colleagues (Feuerstein & Feuerstein, 1991, pp. 3–4.) also adopted the idea of the Zone of Proximal Development (ZPD), which is associated with Vygotsky (1978). According to Feuerstein, there is a zone of proximal development in every human being in light of cognitive functions (Feuerstein & Feuerstein, 1991, pp. 3–4.)

Mediation in deprived milieus. As a clinical psychologist, Feuerstein (Feuerstein & Feuerstein, 1991) met learners with learning deficits and focused on learning interventions after the Second World War as he worked with Israeli children who had been separated from their parents by the Holocaust. During his work, Feuerstein developed structural cognitive modifiability and mediated learning experience theories. According to Feuerstein, gaps in cultural transmission and cultural deprivation are caused by insufficient mediation and learning dysfunctions. In addition, culture usually denotes the immediate family and their cultural heritage, but culture can also mean the country or region where the learner lives. Lack of cultural mediation can be caused by insufficient mediation by parents or other caretakers. Feuerstein noticed that culturally deprived children showed significant gaps in their ability to learn. Culturally deprived individuals are people who live in exceptional circumstances and who either have not been exposed to or have not been able to benefit from exposure to mediated learning experiences. This lack of cultural transmission or mediation results in rigidity and a low level of adaptability for the individual and the group. Through his observations, Feuerstein formulated a view that the role of cultural transmission and mediation are central to the formation of the propensity or ability to learn. Culturally deprived children had to “learn to learn” via mediation. (Feuerstein & Feuerstein, 1991, pp. 3–52). The role of culture in the form of human transmission is a central factor in the learning process. Here, Feuerstein comes very close to Vygotsky’s theory (1978). The difference is that Feuerstein pays close attention to the conditions of mediation and, that in his view, mediation requires a certain quality to be successful.

3.3.3 Mediation ensured through the quality of interaction

Feuerstein’s (1990, 1991) groundbreaking contribution to the theoretical idea of mediation is that he states that the quality of mediation is essential for successfully mediated learning. While Vygotsky (1978) explained how higher mental processes develop via interaction with cultural tools mediated by human interaction, Feuerstein (1990, 1991) raises the issue of about the quality of this interaction. According to Feuerstein (1990, 1991), mediation is a specific form of interaction that has certain qualities which can be ensured by mediated learning experiences. Feuerstein presents criteria for them as will be clarified in the following sections. The unique effect of mediation is that it creates in the mediatee a “disposition, an additional propensity to benefit from the direct

exposure to stimuli” (Feuerstein, 1990, p. 79). This means that the learner experiences a willingness to learn. According to Feuerstein (1990), this transition requires the active intervention of a mediator whose intentions transcend the immediacy of the interaction.

3.3.4 Mediation supported by human mediators and tools

Human mediators. A lack of human mediation can cause severe deficits in human learning and development. Feuerstein (1981) focuses on the role of human mediators in reciprocal interactions in face-to-face situations. Human mediators act as interpreters and helpers in learning situations and carry and interpret the cultural code. Human mediators are marked by their intention to transmit to the mediatee cultural values, behavior patterns, and communicational modalities in order to pass the cultural code and produce a system that will help establish a reciprocal relationship (Feuerstein, 1981, p. 96).

Tools in learning. Although Feuerstein does not talk about tools as mediators, he developed the widely used Instrumental Enrichment (IE or FIE) program and the Learning Potential Assessment Device (LPAD), which are based on his ideas regarding the role of mediation in the learning process. IE and LPAD can be regarded as tool mediators. The IE program is an intervention method used to boost cognitive development, focus on different cognitive operations to enhance cognitive functions, and create insight. The instruments are designed to maximize intensive motivation and serve as a vehicle to implement the criteria and principles of mediated learning experience (Feuerstein, 1980). The LPAD pioneered the idea and developmental evaluation process of human intelligence. Feuerstein (2000) and Kozulin (2011) have called for further development of the ideas found in the LPAD and IE.

3.3.5 The three necessary criteria for mediated learning experiences

The quality of mediation should be ensured by at least three criteria for mediated learning experience (MLE) to occur (Feuerstein & Feuerstein, 1991, p. 15). The three criteria of mediation are all necessary conditions for mediation; these criteria are mediation of intentionality and reciprocity, mediation of transfer, and mediation of meaning. Feuerstein states that they are transferable from one culture to another, because they do not require language (Feuerstein & Feuerstein, 1991, p. 15).

Mediating intentionality and reciprocity. The mediation of intentionality and reciprocity helps students understand the purpose of studies and understand how they use their cognitive abilities. Students also build conscious acts in their learning process through personal responses and communications. Feuerstein (1991) states that intention transforms each of the three components

in the interaction: the stimuli, the mediator, and the mediatee. It also changes the mental, emotional, and motivational states of the mediatee; for example, the goals of a study course are clarified to the student and he or she processes them in his or her mind. The mediator strives to share this intention with the mediatee. Reciprocity relates to the communication and interaction between the mediator and the learner. It refers to the way the mediator builds up the mediatee's response and makes the individual aware of the intention of the interaction (Feuerstein & Feuerstein, 1991, pp. 17–20).

Mediation of transfer involves bridging previous experience and lessons learned in the current situation to new situations. Feuerstein (1991) points out that mediation of transfer is present from the very beginning of mediation, and it should not be attributed only to a situation in which generalizations, conceptualizations, and abstract functions are mediated. Even an uneducated or low-functioning mother may transcend the immediate goal of the interaction (Feuerstein & Feuerstein, 1991, pp. 20–24). According to Haskell (2001, p. 24), almost all learning requires transfer, i.e., carrying over previous learning to new situations.

Mediating Meaning. Mediation of meaning involves providing tools students can use to understand the meaning of their learning accomplishments in a more profound sense. It relates to personal experiences of value and purpose. A lack of meaning affects the mediator and the mediatee as well as the amount, nature, and intensity of the mediation. According to Feuerstein, the pedagogical and didactical reasoning of teachers or parents is often kept secret, but MLE is “animated by the intention to transcend, [and] mediates to the mediatee the meaning of the interaction” (Feuerstein & Feuerstein, 1991, p. 24). It is important to help students understand the purpose of studying in a broader sense and not just the immediate or academic goals of studying, such as grades.

3.3.6 Evaluation of Feuerstein's theories

Evaluation of the Mediated Learning Experience (MLE) criteria. Tzuriel (2000, p. 218) states that although Feuerstein et al. (1995) suggested 12 MLE criteria, mainly the five first criteria have been operationalized in research (see Klein, 1988; Lidz, 1991; Tzuriel, 2000). In his studies of infants, Tzuriel (2000, pp. 231–232) sampled MLE interactions in two distinct situations: free-play and structured. He notes that Vygotsky and others made a similar distinction between the two contexts (Vygotsky, 1978; van Geert, 1994; Wertsch, 1984) as they distinguished between play and instruction. Based on five different studies, Tzuriel et al. have been able to verify the five first criteria of mediation: intentionality and reciprocity, transfer, meaning, competence and self-regulation. (Klein, 1988; Tzuriel & Ernst, 1990; Tzuriel & Weiss, 1998a; Tzuriel et al., 1998). Tzuriel notes (2000, p. 238) that Vygotsky's theory has not

produced research exploring specific mediational mechanisms that contribute to cognitive development.

The understanding of the human aspects of mediation is still episodic. Kozulin (2003, p. 19) observes that the parameters of human mediation presented by Feuerstein are too many in number and are too context-dependent to allow for simple classification. He shows that research brings forth and emphasizes mediators other than the first three mentioned above (Kozulin, 2003, pp. 19–23). Significantly he remarks “that studies of human mediation aspect of mediation confirmed the importance of mediated learning, but at the same time revealed the episodic character of the understanding of this phenomenon”. However, he observes that common classification of mediated interaction is missing. Kozulin (2003, 23) suggests that “Neo-Vygotskian researchers might wish to take cues” from Feuerstein's MLE theory and classification.

Educational interventions. Feuerstein's theory (1990, 1991) has a broad field of applications in areas such as educational interventions, remediation of clinical character, and dynamic testing of intelligence and learning potential. Shayer (1997, p. 45) argues that Piaget's (1995/1926) thinking on cognitive development is not sufficient to explain what takes place during an intervention and advocates for the importance of the concept of mediation. According to Shayer (1997, p. 48), Feuerstein's (1980) IE program was the first successful intervention program.

Intervention can also be seen as remediation, which helps learners with learning disadvantages or during rehabilitation. Feuerstein's IE program has been used with success to help students with learning deficits (Feuerstein, 1972; Ben-Hur, 1994; Collins, 2001; Skuy et al., 1995; Kozulin et al., 1997). Kozulin (2000, pp. 257–273) states that Feuerstein's IE program has been successfully used with disabled students, children with special learning disabilities such as reading problems, normal or low-achieving students, gifted students, and culturally different or minority students. During the last decade Feuerstein, Ra S., Feuerstein, R. (2005, Learning disability or deficient learning? Permanent trait or changing state) and Feuerstein, R, Feuerstein, Ra and Falik (2010) have discussed and demonstrated the use of Feuerstein's methods with disadvantaged children. Also, in a recent study, Kozulin et al. (2011) state that it is possible to significantly improve fluid intelligence in children with cognitive impairments using a comprehensive program such as Feuerstein's IE program, which is based on mediated learning experience. The program has also been used to rehabilitate patients with brain injuries in International Centre for the Enhancement of Learning Potential (2013, ICELP, Feuerstein Institute).

Adey et al. (2007, p. 88) observe that among a few cognitive intervention programs that have proven efficient, Feuerstein's IE program may be the best

known. They also affirm that Feuerstein et al. (1980) were among the earliest researchers to provide evidence that IQ was not a fixed value for individuals but could be boosted. They regret that the major obstacle to the wider adoption of IE may be that its originators will not release the published materials except as a package that includes an expensive teacher-training program. Adey et al. (2007) note that it is understandable to try to ensure proper implementation of IE, which, according to them, the materials alone can never achieve. They remark, however, that schools and individual teachers will not be likely to buy into a scheme without inspecting it first. The other problem, which all direct methods have in common, is that IE requires finding extra time in addition to the content-based curricula used in schools.

3.3.7 Using Feuerstein's theory for web-based learning: key aspects

The following are key aspects of Feuerstein's (1991, 1990) theory of mediation concerning web-based learning.

- Qualitatively functional mediation creates mediated learning experiences according to Feuerstein (1991). The theory of mediated learning experiences brings the theory of mediated learning closer *to practical ideas about how to implement successful mediation*. Continued work is necessary to locate functional descriptors of qualitative high mediation in web-based learning.
- Mediation is supported with human mediators and web-based tool mediators. Feuerstein's theory (1990, 1991) did not predict the possibility of *virtual human mediators*. Feuerstein's view is that mediation requires the involvement of human mediator, but instead of a face-to-face mediator, the human presence can be substituted with an online teacher or guide in most cases. In this study, the online teacher acts as the human mediator. Feuerstein's IE program and LPAD show how successful tool mediators can be. In web-based learning, tools designed by humans can support the learner and partly replace the need for a face-to-face human teacher.

4 THE INTEGRATED THEORETICAL VIEW AND REFLECTIONS ON THEORETICAL PERSPECTIVES

4.1 The integrated definition of mediators in learning based on Vygotsky and Feuerstein

The previous chapters presented key aspects of mediation based on Vygotsky (1978) and Feuerstein (1990, 1991) as related to web-based studying. They are viewed jointly here to find their similar and complementary ideas. Using Feuerstein's and Vygotsky's theories, key aspects of mediation can now be formulated as an integrated definition of mediators in the context of learning.

The integrated definition of mediators focuses on the task, quality and types of mediators

The *task* of mediators is to act as learning promoters that trigger, support, and amplify learning. Both theories posit that mediation promotes learning. While Vygotsky (1978) highlights the roles of tools and social mediators in the learning process, Feuerstein (1990, 1991) focuses more on mediation from other people such as parents or teachers. However, in order to promote students' cognitive functioning, he also developed globally used tool sets for instrumental learning enrichment and assessing learning potential, even if they are not directly called mediators. The *quality* of mediators is essential in learning, and the quality can be ensured by mediated learning experiences. Mediators of learning can be found by investigating mediated learning experiences of the learners. Feuerstein (1991) sets criteria for them, but this study holds the view that mediated learning experiences cannot be fixed beforehand. However, the idea of looking for fruitful mediation experiences is important in order to determine what kind of mediators are behind them even if permanent criteria for mediated learning experiences are not set. Vygotsky (1978) does not set any criteria for mediated learning, and he argues that all learning is mediated. The *types* of mediators are social/human mediators and tool/symbolic mediators. Table 3 presents the integrated definition of mediators as learning promoters based on Vygotsky's (1978) and Feuerstein's (1990, 1991) theories.

Table 3. The Integrated definition of mediators as learning promoters based on Vygotsky and Feuerstein.

KEY ASPECTS OF MEDIATORS BASED ON VYGOTSKY	THE INTEGRATED DEFINITION OF MEDIATORS	KEY ASPECTS OF MEDIATORS BASED ON FEUERSTEIN
Mediators stimulate learning activities ↔	<div>1. THE TASK OF MEDIATORS IS TO ACT AS LEARNING PROMOTERS.</div> <div>They trigger, support, and amplify learning</div>	↔ Mediation supports learning experiences
All learning is mediated, but Vygotsky states that higher mental processes of learning require more advanced tools, which he calls psychological tools. ↔	<div>2. LEARNING REQUIRES HIGH QUALITY MEDIATORS, which IS ENSURED BY MEDIATED LEARNING EXPERIENCES.</div> <div>Mediators of learning can be found by investigating these</div>	<div>In order to learn well, students need high quality mediation, which is ensured</div> <div>↔ by mediated learning experiences (MLEs). Mediation is a specific form of interaction that has to fulfill certain criteria for MLEs according to Feuerstein.</div>
Tools and social mediators have an important role in learning ↔	<div>3. THE TYPES OF MEDIATORS are Social/Human mediators and Tool/Symbolic mediators</div>	↔ Human mediation is necessary. Learning tools such as IE and LPAD are developed to improve learning.

4.2 Digital technologies from the perspective of mediation

This study suggests that new technologies can be studied, interpreted and used with successful mediation and the phenomena of mediation needs to be understood *on conceptual and practical level*. Pea (2004, p. 445) asks “What work does the concept of scaffolding do in theories of learning and instruction?” Pea uses the concept of scaffolding instead of mediation and argues that scaffolds are not found in software but are process functions that relate people to performances in activity systems over time. Pea critically notes that mediation research focuses more on properties of software and curriculum for science

inquiry than on learner performances and transfer of learning. According to Pea, the goals of scaffolding research in the future should be on studying “how scaffolding processes – whether achieved in part by the use of software features, human assistance, or other material supports – are best considered or understood in order to illuminate the nature of learning” (p. 426). He calls for “thickly textured” empirical accounts of how scaffolding processes in such activity systems work in comparison to their independent performances, even when (and perhaps especially when) the results deviate from the best intentions of their designers. (Pea 2004, pp. 423–451.)

Pea’ question about the role of the conception of mediation in theories of learning and instruction can be *unlocked* and partly answered by notifying Kozulin’s and Säljö’s views of technologies re-shaping or transforming cognitive mechanisms, the way we learn. They have raised the issue of mediation to the center of their research as they have developed further Vygotsky’s (1978) research on mediation as the conceptual key to understand what takes place when learning changes (Kozulin, 1990, 2000, 2003, 2011; and Säljö 2000, 2004, 2005, 2010).

We face a new way of learning according to Säljö (2004). Säljö (2010, 53) points out that “learning technologies do not merely support learning; they transform how we learn and how we come to interpret learning” (p. 53). Earlier Säljö (1997) has stated that,

...Learning is the simultaneous transformation of social practices and of individuals. Just as new technologies and new intellectual tools transform social practices, so do they transform individuals who walk away with a new set of instruments by means of which they can relate to the world. (Cited in Bliss, Säljö & Light, 1999, p. 10)

This study views that learners’ understanding of technology is highly dependent on *what kind of mediators are available in the context of digital learning* and how the use of digital tools is supported, what kind of human or tool mediators are available to support the learner. The digital tools are all mediators, however they should be easy enough to be fully utilized. Säljö tangles with issues, which are connected to mediation in digital settings. Säljö (2004) is calling for functional technologies and also remarks that institutions and learners should understand and utilize technologies to their full potential. The new hybrid forms of learning and knowledge bring an additional challenge to the learners according to Säljö (2010). He (2012) is also addressing the issue of inclusion in the complex societies of today.

Säljö (2004, 492) remarks that if technologies would work as they were designed to, it would usually imply a rather intense shift of education. Säljö, (2004, p. 492) observes that “the critical issue in this context is: is the manner in

which technologies are used in schools and universities conducive to such a change?" (p. 492). Säljö calls for investigation about how the learners make use of digital technologies, because their approach to studying is not necessarily optimal for digital settings. He maintains furthermore that learners' understandings of technology, their view of learning and also their epistemological beliefs should be studied. (Säljö 2004, pp. 489–494.) He also raises the issue of educational inclusion in the complex societies of today.

Learning and knowledge are transforming and learners need to be supported even with use of advanced learning and knowledge tools. Säljö (2010, pp. 53–64) has reflected the relationships between digital technologies and learning highlighting the hybrid nature of *both* human knowing and learning. He argues that "*what we know and master is, to an increasing extent, a function of the mediating tools we are familiar with*" (p. 53, italics added in this presentation). He highlights the "performative and transformative view of learning and knowing: to learn something is to be able convert information stored in the expanding external symbolic storages of our social memory into something that is new, interesting and consequential for a practice or an issue" (Säljö 2010, 61). The impact of hybrid nature of learning and knowing can be understood by Säljö's (2010) observation that technologies have become partners in learning and knowing. Learning is transforming, but in addition to this, the ways in which knowledge is stored and used is constantly changing. The students have to learn to utilize the new kind of dynamic knowledge, the kind of externalized intelligence mindware represents, in skillful ways.

What the changing understanding of learning and knowledge escalated by digital technology means for educational institutions and learners has been discussed by Säljö (2012) lately. Säljö observes that "All over the world education is expanding as a social activity" and has been widely detected "as a key element in social development" (2012, p. 9). Säljö raises the issue of how to ensure education in the complex societies of today provide education – even to learners having problems with learning or to marginalized groups. Disengagement of some learners in education is not something which has to be taken as granted by policy makers or schools. Säljö (2012) argues that "research has an important role to play when it comes to providing tools and analyses for understanding the dynamics of education in complex societies" (p. 12.). He suggests that "Classroom activities should be "unpacked in their details and functional patterns", because it is important to understand what makes the learners to *participate* in the study process and what makes them to become *disengaged*. This study views the issue of participation from the aspect of mediators. What kind of mediators need to be developed in order to involve the students in productive learning in the digitally immersed late modern societies. The

mediators need to be tailored based on the individual knowledge base and cultural background of the learners.

Kozulin (2011, p. 85) states that *mediation re-shapes cognitive mechanisms*. Gouzman and Kozulin (2011) have investigated how Feuerstein's Instrumental enrichment (IE programme) can help immigrant and minority students to be admitted to a technological college. The results support the use of IE programme. Kozulin (2011, 85) maintains that the transition to advanced technological society is, to a significant degree, associated with the acquisition and internalization of new sets of symbolic tools and sociocultural activities. Furthermore he observes that there is little reason to make a sharp distinction between the content of thinking and its form. According to Kozulin the new content requires re-shaping cognitive mechanisms; in this way, new forms of thinking are generated. (Kozulin, 2011, 85).

Mediation is more than things mediated by digital media. It can be argued that mediation is a concept that *transcends and includes* digital technology. Hegel's (1969) and Peirce's (1998) view of mediation included the omnipresence of mediation as the tool for humans to interpret reality. Although mediation has always existed, digital technology is a new, rich tool for it, and new and more human dimensions can be added to the phenomena of mediation in relation to media technologies. The philosophers have observed the expansion of media technology in society with criticism but also approval Heidegger and Baudrillard arguing that media is distorting the human reality and praise of some as Introna and Sandbothe who see the positive change of human acting and thinking processes. (Latva-Karjanmaa, 2008 and 2009). The communication scientist Schulz (2004, pp. 87–101) argues that digital technologies extend, substitute, or even amalgamate human activities.

A reexamination of Vygotsky's (1998) and Feuerstein's (1990, 1991) theories is needed. Regardless of the fact that they were developed when technology-based learning environments did not exist, they are still relevant. They might, however, need to be complemented with new concepts or conceptual thinking. This study asks how mediation can be described through students' experiences. How students experience technology-enhanced learning tools, human assistance, or other material support is investigated in this study using the IQ Learn system during a course on self-regulation. This study is directed towards the question of how mediators can be described in the context of learning self-regulation and what the core qualities of mediation are. The research is not targeted towards learning outcomes (more self-regulated students) but instead towards the process of mediation or rather the students' experiences.

4.3 The challenge of mediation and the origin and agency of self-regulation

This study focuses on mediation in web-based course environment with learning self-regulation as the learning context of the course. The course environment used in this study is built using Pintrich's (1999; 2000) sociocognitive ideas on self-regulation since the IQ Learn learning environment and tools are based on Pintrich's theory adapted by Niemi and Ruohotie (2002). This study is striving to identify mediators in the learning process in order to find out, how mediators can support students while they learn to become more self-regulated,

The sociocognitive approach holds that self-regulation is born in human cognition and the learner is the leading agent in the learning process. The sociocultural approach holds that the genesis of self-regulation is in sociocultural environments, in interactions between human beings and their social environments, and that agency in learning is shared by learners and their social environments.

Learning is more than the leadership and agency of human beings; it is a shared process or the leadership and agency with the social environment in which humans interact with the environment and mediators. The fruits of these interactions are visible through the experiences told by learners and in learning outcomes in form and knowledge, which can be observed by others. The question is how much the various approaches to learning of affects the understanding of the role of mediation in this study.

The sociocognitive and sociocultural approaches on learning differ in their understanding of self-regulation in two main aspects: (a) the origin of self-regulation and (b) their view on agency in the learning process of self-regulation.

The sociocognitive view on self-regulation. According to Bandura (1986), self-regulation is a part of sociocognitive theory. Research on self-regulation has been developed among scholars who mostly rely on a long line on cognitivist's or sociocognitivist's ideas of learning, such as Zimmerman and Schunk (1997), Zimmerman (1998), Boekaerts (1997, 2005), and Pintrich (1999; 2000). They draw from Bandura (2001, pp. 1–26) who focused on human agency in learning in his social theory and elaborated it into a sociocognitive theory (see also Pintrich, 1999, Zimmerman & Schunk, 1997; Boekaerts, 1997).

One can ask, how “social” is seen in the sociocognitive theory of self-regulation? The socially given seems to be offered to the learner in form of learning material provided by instructors and other actors in the society, but it is *organized* by the learner's own mind. Zimmerman, Bonner, and Kovacs (1996) present a four-level model of how self-regulation developed through social influence on a learner. In their model, learners observe and then imitate the teacher, after which students perform on their own and finally act in a self-

regulated manner when they learn to adapt to a changing environment. Schunk and Zimmerman (1997, p. 199) stress the role of social environments in learning and state that self-regulation develops through imitation of external models. They also state that the *source* of self-regulatory skills is primarily social at the two first levels (observation and imitation) but the focus shifts to self-source at more advanced stages. Moreover, Schunk and Zimmerman (1997, p. 195) observe that cognitivists have shifted their focus to describing self-regulatory development while observing that learning is influenced by social and self and highlighting the learner as agent. They emphasize that from a sociocognitive perspective, learners are active in interpreting and reorganizing ideas whereas the instructor's role is to orchestrate learning. In addition, Boekaerts and Cascallar (2006, p. 204) describe the social dimension of self-regulation from the perspective of what the environment can give and *not from the perspective of interaction*. They provide a list of teacher behaviors that have an effect on the way students self-regulate their learning: clarity and pace of instruction, the amount of structure provided, autonomy granted, teacher enthusiasm, humor, fairness, and teacher expectations about students' capacities.

The sociocultural view. The core of the sociocultural view of self-regulation can be encapsulated as progressing from other-regulation to co-regulation and finally into self-regulation. Based on Vygotsky, socioculturalists such as Wertsch (2008/1979), Diaz (1990), Hadwin (2005), and Özdemir (2011) discuss self-regulation as developing *in interaction* between the learner and the social environment. Interaction has developed through the internationalization process. Wertsch (2008, 1979) interprets that Vygotsky's idea of self-regulation is that it is a higher mental function that has developed as an internationalization process through social interaction, and the development of self-regulative capacities takes place in communicative settings involving other-regulation. He outlines the levels of interaction in sociocultural approach as the transition from other-regulation to self-regulation, which is based on Vygotsky's (1978) thoughts (Wertsch 2008/1979).

Hadwin, Wozney, and Pontin et al. (2005) note that the sociocultural view of self-regulation criticizes the vague attention given to interaction and social environment in the prior models. Their findings support a sociocultural perspective of self-regulation demonstrating a transition *from teacher to student regulation* across phases and facets of self-regulation. These transitions take place through active teacher-student interaction. Hadwin et al. (2005, pp. 413, 418) analyze the differences between the sociocultural and sociocognitive roles of learning in terms of who the active agent in learning is. Their findings support a sociocultural perspective of self-regulation that demonstrates a transition from teacher to student regulation across the phases and facets of self-regulation. This transition takes place through active teacher-student interactions. According to

Hadwin et al. (2005), McCaslin and Hickey (2001) build on similar sociocultural foundations. McCaslin and Hickey (2001) emphasize the role of interactions in which teachers and students transition from co-regulating learning to self-regulation.

In this study, the social aspect of self-regulation is viewed through the concept of mediation and the social/human aspect of mediation. The focus is on mediation and how learning can be supported and promoted through mediation. Although sociocognitive researchers have mapped concepts describing the components and processes of self-regulation, the sociocognitive tradition would benefit from a description of what takes place when learning is mediated, i.e., supported and promoted in a learning environment that is created socially and culturally by other human beings. However, also the sociocultural approach to self-regulation would be more useful if mediation as a concept was elaborated more from the aspect of how the students experience the mediators and what role mediation has in self-regulation.

How then do different views on the role of individual learner vs. society in relation to the origin and agency of self-regulation affect finding mediators? This study holds that the origin and agency of self-regulation *can vary from learner to the social environment and back to the learner in a fruitful interaction* as presented in Table 4. The agency of self-regulation is socially rooted for example, when a group of people act and create knowledge together in a joint learning situation. The singular learner is the agent for example, when s/he decides how she should proceed with a learning task, read and search for more information, or use the material given to her in advance. Digitally transmitted learning environments offer improvements for these developments. The student can join a group of learners when for example completing an assignment of statistics, if s/he experiences that help is needed. The students can find the solution jointly, but even here the agency can vary, one of the students may take charge (and agency) lead the discussion and suggest the solution, but the group can also find it jointly by writing on an interactive whiteboard until the solution is finally found in a joint process.

Table 4. The varying origin and agency of self-regulation in sociocognitive and sociocultural view.

Sociocognitive view	Sociocultural view
<p>Self-regulation is learned with the learner as agent of the cognitive development, though in interaction with the social environment.</p> <p>→ If the learner carries more of the “load” of successful learning, the quality of mediators needs not be very high and the learner can be offered knowledge and information, which he or she can elaborate upon without help from human or tool mediators.</p>	<p>Self-regulation originates in sociocultural environments in interaction between the human being and his or her social environment, and the agency in learning is shared by the learner and his or her social environment.</p> <p>→ If the “load” of successful learning is carried by the mediators and the learner, the quality of the mediators needs to be high enough to make learning “happen.”</p>
<p>Learning is constant interaction within the social sphere and includes sharing, creating, and co-sharing again. A group of people can share regulative thoughts and actions, but individual learners and their mental processes can also be initiators and agents in the self-regulative process.</p> <p>This study notes the importance of investigating high-quality mediators, because learners can benefit from mediators supporting learning processes. More attention should be paid to the quality of mediated learning experiences in order to find the best methods of learning and instruction.</p>	

4.4 Mediation as a bridge between the learner and the sociocultural environment

Säljö (2009, pp. 202–208) states that cognitivist and sociocultural theories share an interest in thinking, but they conceive of cognitive processes and their genesis very differently. Säljö discusses the concern expressed by Alexander, Schallert, and Reynolds (2009) about the current diversity of theoretical perspectives on learning which in their mind has resulted in a fragmentation that is destructive to the field. However, Säljö (2009) notes that while it is important to engage in explicit discussions of how learning is constructed in different traditions, Alexander et al. (2008) do not give sufficient recognition to the significant epistemological and theoretical differences between traditions. However, he remarks that an acceptance of incompatibilities in perspectives is not necessarily a problem as it can provide a richer frame of reference from which to analyze learning.

Säljö (2007) outlines a significant difference between the object of inquiry and the unit of analysis and argues that attention should be paid to congruence. In this study, the object of inquiry concerns what kind of mediators can promote self-regulation. There seems to be *a lack of elaboration on the concept of mediation in self-regulation research*, and this study argues that this elaboration is necessary. Vygotsky (1978) elaborates on the concept of mediation and classifies mediators as social (human) or tool mediators. Feuerstein notes (1990, 1991) that it is important to study the quality of mediation while paying attention to the criteria of mediation. The unit of analysis in this study is the learning experiences of students as this study assumes that this can lead the way to detecting the mediators behind the experiences.

Mediation as a conceptual bridge

This study aims to focus on mediators regardless of the perspectives presented above. The ideas of the origin and agency of self-regulation in the sociocognitive and sociocultural approaches are different. But how much do they dictate the learning environment and its pedagogical settings? If one believes in the power of learners' social environments as a place where learners "take over" their own learning process, much more attention should be paid to the quality of and elements of interactions in learning settings, be they human or tool interactions. The theories of mediation presented in this study target this problem or challenge of quality of the learning environments, since they are presenting mediators which aim to act as support of the learning process. After discussing the differences in the sociocognitive and sociocultural perspectives on self-regulation, Hadwin, Wozney, and Pontin (2005) state,

Regardless of the social perspective chosen, there seems to be consensus that students should learn to adopt or take control of their own self-regulatory strategies and processes. There should be a shift from teachers doing the regulating by providing direct instruction and modeling toward the student taking control and demonstrating self-regulatory competence. (Hadwin, Wozney, & Pontin, 2005, p. 420)

This study focuses how this shift is supported via mediators. Mediation is a concept used both by sociocognitive learning researchers and sociocultural learning researchers who investigate self-regulation in web-based learning. The sociocognitive and sociocultural approaches to self-regulation describe how learners become more self-regulated. However, this study suggests that *both these approaches* would benefit from utilizing the concept of mediation as a conceptual and practical tool to analyze and describe how mediation works in web-based learning where self-regulation is needed. The following figure (Figure 5) shows how mediation can work as a conceptual bridge between the

sociocognitive and sociocultural approaches of learning. At this stage it is still an *unsolved challenge*.

Figure 5. Mediation as the conceptual bridge between the learner and the sociocultural environment.

5 RESEARCH DESIGN AND METHODOLOGY

5.1 Methodological background

The methodological approach in this study is qualitative. On the philosophical level, it relies on phenomenology; on the methodological level, it relies on qualitative methodology approaches presented by Creswell (2007, 1998), Kvale (1997), Kvale and Brinkmann (2009), and Giorgi (1985, 1997). They all (1) examined the philosophical bases of qualitative research, (2) defined their views of qualitative research coherently, (3) presented methods for finding data, and (4) described how to analyze data using qualitative methods. In addition, they all saw the phenomenology-based view of qualitative methodology as a feasible approach towards methodological questions.

5.1.1 Studying mediation as qualitative phenomena

The study aims to analyze mediated learning through *qualities of mediated experiences* in web-based learning. The approach to the problem at a philosophical level is phenomenological, and the “unit of analysis” is the human experience of learning support. The human experience is seen as a quality that is unique and not quantitatively measurable. Schwandt (2001) states, “qualitative inquiry deals with human lived experience. It is the life-world as it is lived, felt, undergone, made sense of, and accomplished by human beings that is the object of study” (p. 84).

As the research question states, the aim is to analyze what kinds of mediated experiences can be traced when students study in a web-based course on self-regulation. As a concept of qualitative research methodology, experience refers to a study of human experiences of a certain phenomenon. These experiences can be students’ accounts about their affections, thoughts, and activities. The expected data consists of students’ accounts of what they experienced *taking place* at the course.

Qualitative methods always include an implicit or presented philosophical base. Kvale (2008, p. 26) explains the implications of the phenomenological approach that are customary in qualitative research and states that a phenomenological approach is “in a general, non-philosophical” sense prevalent in qualitative research. However, Kvale and Brinkmann (2009, p. 26) declare that the phenomenological approach in qualitative research enables understanding social phenomena from subjects’ own perspectives and describes the world as experienced by them.

As van Manen (1990, p. 33) notes, qualitative research asks *ti estin?* (What is it?). This study aims to obtain knowledge about how learners experience the web-based environment. The question is explorative and approaches the problem from an individual learner's angle. The data searched for is qualitative and is based on individual experiences. Typically, five or six various types of qualitative research are noted. Creswell (2007, pp. 53–100) lists five types of research, such as narrative, phenomenology, grounded theory, ethnography, and case study, as general forms of qualitative research design. Denzin and Lincoln (2000) include phenomenology, ethnography, grounded theory, and hermeneutic phenomenology in types of qualitative research.

Giorgi (1986, pp. 5–7), a pioneer of empirical phenomenological methods, remarks that some psychological research problems are qualitative and ask how phenomena are qualitatively different from another. These questions do not tackle quantity. He claims that some qualitative procedures are necessary, while the transformation from a quantitative scale to qualitative one is not possible. Phenomenology as a discipline attempts to discover and account for the presence of meanings in a stream of consciousness by systemizing them.

Creswell (1998, pp. 73–74) states that qualitative researchers approach their studies with a certain paradigm, worldview, set of beliefs, or assumptions. Based partly on Cuba and Lincoln (1988), Creswell (1998, p. 15) lists philosophical assumptions: ontological, epistemological, axiological, rhetoric, and methodological. In addition, he provides five main approaches to qualitative research: narrative, phenomenological, grounded theory, ethnography, and case study. Although this research also has narrative, grounded theory, or ethnographic features, it is most like the phenomenological approach when looking at the focus of the research and the expected type of data (information) sought. In addition, when looking at other literature (van Manen, 1990; Kvale 1998; Denzin, & Lincoln, 2000; and Giorgi, 2003), the phenomenological approach has the most characteristics that fit the interests of this research.

- The focus of the research is on a “partly unknown terrain”: The aim is to understand the essence of the experience of support through mediation when studying in web-based settings. Although the study includes a theoretical review and pre-set ideas of mediation, *the aim is not to validate these theories as a complete explanation of the phenomena.*
- The type of problem is suited for phenomenological approach: The need to describe the essence of the phenomenon of the lived experience, i.e., the essential experiences of mediated support in web-based studies. In a narrative, the focus is more on individual experiences; here, the idea is to find *themes that individuals share* in their experiences of mediated support.

5.1.2 Studying experiences

When asking epistemologically what is known about human experiences, phenomenology enables the approach of looking at meaning in the flow of human experiences. As a branch of philosophy, phenomenology deals with what are usually called epistemological or ontological questions (related to entities) about the human consciousness and mind. Husserl (1901) states that the essential feature of the human is consciousness. Husserl (1901, 325) describes consciousness through three dimensions: as the marker of the human existence, as the mental tool for creating awareness of one's own experiences, and as the marker for psychological acts or intentionality. (1) He defines that experiences represent the fully real existence of the empirical ego. "Consciousness as the entire real (reelle) phenomenological being of the empirical ego" (as translated by Finlay in Husserl, 2001, p. 81). The original expression as "Bewusstsein als der gesammte phänomenologische Bestand des geistigen Ich." (Husserl, 1901, p. 322). (2) He presents that consciousness is "the inner awareness of one's own psychic experiences" (trans. by Finlay in Husserl, 2001, p. 81). "Bewusstsein als inneres Gewahrwerden von eigenen psychischen Erlebnissen." (Husserl, 1901, p. 322). (3) Finally consciousness as a comprehensive designation for 'mental acts' or intentional experiences (transl. by Finlay in Husserl, 2001, p. 81). The original expression as "Bewusstsein als zusammenfassende Bezeichnung für jederlei "psychische Acte" oder "intentionale Erlebnisse". (Husserl, 1901, p. 322).

According to Moran (2005), Husserl wanted to recognize the primacy of our life-world. As conscious beings, we inhabit an experiential world, and the general structure enables objectivity and thinghood to emerge in different ways in different cultures (Husserl, 1913, 1952). Husserl is still very relevant in research of consciousness. This is shown, for example, by Varela (1996), who established the research area of neurophenomenology, which discusses and develops research on phenomenology with an extension to neuropsychology, i.e., the co-existence of a new interdisciplinary field of research. Noë (2004) presents a way to view phenomenology and cognitive science as co-existing systems.

5.1.3 Epistemological issues in the data gathering method

The issues about knowledge produced in this study should be discussed in this chapter as well since the data gathering method is closely tied to the qualitative and phenomenological methodological approach used here.

Data gathering is realized through research interviews, background questionnaires, and text in diary assignments. Kvale (1996, p. 14) states that the qualitative research interview is a "construction site of knowledge", and that the concept of knowledge as a mirror to reality has been replaced with the concept of

the social construction of reality focused on interpretation and negotiation of meaning in the social world. Kvale and Brinkmann (2009) present various epistemological issues discussing the philosophical positions of pragmatism, phenomenology, dialectical standpoints, and postmodern thought. Kvale and Brinkmann (2009) note that phenomenology includes a focus on consciousness, the life-world, and openness to the research subjects' experiences. The focus is on making precise descriptions, attempting to bracket the previous knowledge, and searching for essential meanings in descriptions. (Kvale and Brinkmann, 2009, pp. 51–52.)

In the postmodern approach, the certainty of knowledge is less a question of interaction with nonhuman reality than a matter of conversations between people (Kvale and Brinkmann, 2009, p. 53). Subjects are viewed as existing in a “fabric of relations” (Kvale & Brinkmann, 2009; Lyotard, 1984, p. 15). Postmodernism stresses the shift from individual mind to the relations of persons in postmodernism. However, this study stresses the phenomenological view of human consciousness and individual experience. This relates to the aim of the study to find knowledge about individual experiences, although how individuals describe their experiences can also be socially negotiated. This fact is shown through Merleau-Ponty (1962), who is sometimes called a pre-postmodern phenomenologist. He states that “reflection does not withdraw from the world towards the unity of consciousness as the world's basis; it steps back to watch the forms of transcendence fly up like sparks from a fire” (Merleau-Ponty, 1962, p. xiii/1945, p. viii). This is read here as follows: the human thinking process looks at various perceptions and their occurrence in the human mind as interpretations of what is seen and experienced.

5.2 The research setting and data gathering

The researcher sought a group of students who had used IQ Learn. IQ Learn is freely available on the Internet, and a large number of students have used it. A research setting was needed in which a group could use IQ Learn at a teacher's request. Niemi et al's (2003, pp. 49–71) research on the IQ Learn pilot project, which concluded that the IQ Learn tool best supports the students in learning when used with a teacher-tutor. As noted in section 3.5, the IQ Learn system allows a teacher to invite a group of students to use the platform for their studies on self-regulation.

The research was conducted at the Karelia University of Applied Sciences (Karelia UAS). The empirical research setting included two pre-studies and a final research phase. The research phase participants were Karelia UAS students studying in a four-week web-based course with IQ Learn tools in spring 2003. In all, 15 students in the course completed the course, which was an optional part of

their studies. The students were first-year students in the Business Information Technology program. A semi-structured interview was conducted with the students after they completed the IQ Learn course.

5.2.1 Data gathering and type of data

The main source of data was interviews, but the interview data was supported by students' diary texts, which consisted of their written assignments that were sent to the online teacher. The researcher also used a short background information form to collect data from the students. The students were informed that this material would be used for a research study and that it would be confidential.

Background information was gathered at the beginning of the school year when the students were freshmen at Karelia UAS. The pre-structured questions collected information about age, educational background and prior use of e-learning systems; the forms also included open-ended questions about what the students expected from this school and their education program and if they had received support in their studies during their prior educational experiences.

Diary texts. During the "How do I develop myself as a learner" course, students were asked to complete their assignments with the IQ Learn diary tool and send them to the online teacher using the IQ Learn system.

Interviews. The semi-structured interview was tested and developed during two pre-studies. The development of the interview outline and themes followed Kvale's (2009, pp. 102–105) seven stages for designing interviews.

- **Thematizing:** formulating the purpose of the investigation and describing the concept of the topic to be investigated before the interviews start. This was done in the theoretical part of the study in presenting the research problem.
- **Designing:** planning the design of the study, considering Kvale's seven stages, before the interview starts.
- **Interviewing:** conducting the interviews with a reflective approach to the knowledge sought, based on an interview guide and techniques found in Kvale's (1997, pp. 117–119) general outline for asking certain thematic questions. The interview outline is presented in Appendix C.
- **Transcribing:** all the interview material is transcribed from the tapes using a concise method, where even words meaning nothing and pauses are indicated.
- **Analyzing:** deciding on the purpose and topic of the investigation, the nature of the interview material, and which methods of analysis are appropriate. In this study, the analysis used a triangulation of three

methods: qualitative clustering, empirical phenomenological analysis, and narrative analysis.

- **Verifying:** ascertaining the generalizability, reliability, and validity of the interview findings. In this study, this is performed through concise references to the original interviews (reliability), peer reviews, and triangulation.
- **Reporting:** communicating the findings of the study and the methods applied in a format that lives up to scientific criteria, while considering the ethical aspects of the investigation, and that results in a readable product. In this study, students' profiles were disguised so people with recognizable features (age, different backgrounds than others) do not show in the presented data.

According to Kvale (2009, p. 130), an interview guide is a script that structures the course of the interview more or less tightly. The guide for a semi-structured interview includes an outline of topics to be covered with suggested questions (Kvale, 2009). In this study, the researcher had a self-made interview guide for personal use and guidelines explaining each theme that was a topic in the interview. This was needed in cases when it seemed students had not described their experiences around one theme sufficiently to remind the interviewer about the theme in detail. The outline for the semi-structured interview was based on pre-set ideas of mediated learning in web-based studies with foundations in Vygotsky's (1978) and Feuerstein's (1990, 1991) theories of mediated learning. The themes of the interview were expressed in everyday language and were as follows: the goals of the course, studying in the course, the role of the online teacher, transfer, the usefulness and meaning of the course, managing studying, completing this kind of course with or without an online teacher, and the most useful IQ Learn tool. The interview outline is presented in Appendix C.

5.2.2 The interview arrangements and interview technique

Arranging the interviews. The student interviews were scheduled in the announced course program. This ensured that students would see interviewing as a normal event and that all students would participate. The researcher arranged interview times with students over email. The interviews were conducted over two days at the Karelia UAS. The researcher sent suggestions for time and venue to students and students replied regarding whether the suggested times and places were acceptable to them. All but one student participated (in all, 14 students) due to a misunderstanding about the time and venue of the student's interview.

In the beginning of the interview, the researcher strived for an atmosphere of casual and relaxed discussion. The presence of a recorder was not elaborated on in order to avoid the risk of students' refusing recording. The interviewer simply stated that students could talk in a normal voice and the recorder would record without problems. In addition, some background information topics were raised such as reasons for taking the course, whether students had ideas for developing study skills, how well the course goals were made clear through the informational event and email messages from the online teacher, and how clear the aims were made through IQ Learn.

5.2.3 Pre-studies

Pre-study 1: Interview of voluntary IQ Learn users as part of the classroom course. The empirical data collection process is illustrated in Figure 6. The research was initiated in pre-study 1, which collected information on how Karelia UAS students experienced IQ Learn and tested the initial thematic research interview and interview techniques. The researcher studied the use of IQ Learn through a pre-study of seven voluntary IQ Learn users to prepare for the research interviews.

Figure 6. The empirical data collection process.

During the pre-study 1 phase the IQ Form research group agreed that a teacher and study counselor from Karelia UAS could use the IQ Learn system in connection with instruction teaching during the spring term in 2002, when the IQ Form pilot was launched through the Finnish Virtual University (FVU). After this pilot, the researcher discussed IQ Learn with the teacher and was allowed to interview four of the students who used IQ Learn in connection with their Economy course. The interview was carried out by the researcher to establish whether IQ Learn was as a positive tool that assisted the students' learning and to pre-check the interview themes. The result of this pilot interview indicated that voluntary use of IQ Learn was not useful enough for students to benefit fully from it. Only 7 students of 23 used the system. Of these students, four were interviewed in September 2002. They indicated that it could be a useful tool in studies if used properly. Only one student had used it regularly. The researcher also obtained ideas about how to adjust the thematic interview formula being designed.

Pre-study 2: Using IQ Learn as part of a classroom course. In second pre-study phase, the researcher and the teacher in the first-year degree program in Business Information Technology planned how to use the IQ Learn learning environment as a part of the "Orientation to Studies" course arranged by the teacher. The teacher also acted as the study counselor for the students. The "Introduction to Studies" course was a regular classroom course. This course was a practical orientation to the school for first-year degree program students, and it involved a considerable amount of self-study. IQ Learn was used for one part of the self-studies.

In the fall of 2002, all the first-year students in the Business Information Technology degree program at Karelia UAS used IQ Learn during the "Orientation to Studies" course. During the course, the teacher gave students assignments from the IQ Learn tutoring package to develop their learning skills, and the students used the IQ Learn diary to return their assignments to the teacher. When the course was finished, nine students were interviewed using a semi-structured interview in which the theme was based on theories of mediated learning. The students were acquainted with the IQ Learn system in a face-to-face environment and completed the IQ Learn tests in a face-to-face environment. Then, the rest of the tests and assignments based on IQ Learn were completed autonomously by the student on their own time.

The researcher interviewed the students about their experiences using IQ Learn, but the results showed that the students had not used the IQ Learn environment to a great extent, which made it impossible to evaluate how IQ Learn was working. A thematic interview of nine students using IQ Learn was conducted in December 2002. The researcher was not satisfied with the empirical data from this phase of the research, and the interview data and this

study was reconceived as a pre-study. Only nine students found time for an interview, and their experiences and views on using IQ Learn were vague. It seemed that not enough students had used IQ Learn in a way that made it possible for them or the researcher to evaluate its usefulness. Many of them had only used the IQ Learn test tool, and they had only completed one assignment from the IQ Learn tutoring package.

The second pre-study showed that students were not using the IQ Learn environments to its full potential if a teacher was not supporting or monitoring their progress while using the IQ Learn learning support tools. Many of the students only completed the tests while the tutorial and diary were neglected. It appeared that the use of IQ Learn in connection with a classroom course was not at a level that the students paid much attention to it. The students did not use it more than two times, and they used it quickly and over a too-short period. Therefore, they could not fully utilize the potential of IQ Learn. Most of the nine interviewed students did not recall many of the features available in IQ Learn.

The conclusion of pre-study 2 was that in order to gain information about the usefulness of IQ Learn as a tool for learning self-regulation skills and strategies, a teacher must systematically plan and time the use of IQ Learn. This was the basis for the research during spring 2003.

5.2.4 The research phase: A group using IQ Learn with an online teacher

In order to obtain information about how mediation works when using IQ Learn, it was clear that students needed to use IQ Learn more frequently, use it for a long enough time, and use all its tools.

Preparing the research phase. In December 2002, the researcher suggested to the teacher arranging a course for first-year Business Information Technology degree program students in which IQ Learn would be used systematically and students would benefit from all three IQ Learn tools. A discussion also took place regarding giving study credit to students if they completed the course. The teacher agreed and brought the idea to the director of the degree program, who accepted the idea. The degree program agreed to give one (1) study credit for the course.

The researcher organized a course in Karelia UAS, titled “How do I develop myself as a learner: a tutored use of IQ Learn.” The course was announced on bulletin boards and online blackboards of the NKTUAS at the beginning of the spring term in 2003. In addition, the study counselor and the researcher cooperatively announced it through email to first-year Business Information Technology degree students. In all, 16 first-year students enrolled the course.

Realization of the course. The course was not obligatory, but the earned study credit could be counted towards the students’ degree program as an optional course. The researcher was the tutor (online teacher) for the course, and the

course took place between February 19 and March 27, 2003. The expression “online teacher” was used instead of the more correct expression tutor because the students were not familiar with the concept of a tutor. A face-to-face introductory meeting was held during which the IQ Learn tools and the course program were presented to the students. The students were asked to complete the IQ Learn tests before the course began. Each Monday for four weeks, the students received the assignment of the week via email from the online teacher (Appendix B). They were asked to use the IQ Learn tutorial to find an assignment by themselves based on their test results and what they wanted to develop. They were asked to use the IQ diary tool to write and store their assignments in the tutorial.

In all, 16 students enrolled in the course and 15 students completed the course. After the course ended, 14 students were interviewed. One student was not able to participate in the interview. The schedule for the course and a more detailed course program is attached (Appendix A).

5.2.5 The role of the researcher in the empirical part of the research process

The role of the researcher in this study was to act as the data collector and an online teacher. The researcher designed the background questionnaire, the thematic interview, and the assignments for the course. The researcher also acted as the online teacher during the course. In qualitative research, it is preferable that the researcher conducts interviews so the researcher obtains firsthand information and ensures the themes and questions are formed as originally aimed. Furthermore, the researcher can find out more by engaging in the interview personally. Patton (2002) recommends researchers should “... explore, probe, and ask questions that will elucidate and illuminate that particular subject” (p. 343).

There was, of course, the risk that the researcher would try to influence how interviewees described their experiences, but the interviews in this study were conducted using themes and there were no right or wrong answers. The researcher’s double role as a researcher and the online teacher could be questioned. The students could try to please the interviewer/researcher by describing their experiences during the course as more positive than they actually were. However, the interviews were conducted after the course was completed, and the students had all passed the course except one who quit the course during the second week. In addition, the fact that the students did not know the goal of the research protected the research against preferential effects. The students were asked whether they learned new things during the course, but the learning outcome was not the aim of the research and was not the knowledge the researcher was seeking. The course aim for the students was to develop their

self-regulative strategies or skills in learning, although the researcher's aim was to research *what kind of support they experienced* in the learning process during the course. The students were not informed of this research aim; they were only told that the University of Helsinki wanted to develop the IQ Learn system in a general sense.

Another consideration was researcher bias. Could the researcher unknowingly indicate what kind of response was expected from the students? The research topic was very *explorative* and the researcher could not predict the results beforehand. Furthermore, the interview questions were thematic and the students used their own words to describe their experiences.

5.2.6 The validity of the study

The validity of this study is based on the following:

- triangulation of three analysis methods;
- data display with traceable data links to transcribed interviews;
- peer reviews; and
- definition of the qualitative aim of this study.

The fact that the researcher triangulated three methods in the data analysis. Regardless of the analysis type, the findings indicated the same direction, although the analyses also complemented each other.

The researcher aimed for a data display that was as transparent as possible. In the clustering phase, all the statements were referred to the student who had spoken them. Displaying the data in this way was also used in the phenomenological analyses and in the narrative analysis. Direct citations of the students' statements were also marked with the page so they could be found in the transcribed interviews.

The researcher used peer review by two research colleagues who reviewed the data display in the clustering phase, the phenomenological analysis, and the narrative analysis. They agreed with the researcher about the results of these analyses.

According to Kvale (1996, 1), qualitative research interviews provide an understanding of issues from the subject's point of view and uncover the meaning of their experiences. The aim of this study was a qualitative exploration. Kvale (1996, 65) states that qualitative research interviews can also be objective by "letting the investigated object speak" and expressing the real nature of the object.

5.2.7 Ethical issues

Human interaction in qualitative research affects interviewees and the interviewer. According to Kvale (1996, p. 11), the knowledge produced through qualitative research adds to our understanding of the human condition. Birch, Miller, Mauthner & Jessop stress that ethical problems in qualitative research arise because of complexities in “researching private lives and placing accounts in the public arena” (Brinkmann and Kvale, 2005).

The ethical issues of interview techniques

Brinkman and Kvale (2005, p. 157) criticize the prevailing forms of warm, empathic interviews as ethically questionable. The ethical approach to the interviews in this study was acknowledged by the interviewer by avoiding long and intimate conversations with the interviewees about their life situations, their personal problems, and experiences with their current school and teachers even if the interviewee was self-initiated talking about these issues during certain passages in the interview. Ethics in the interviews meant (1) focusing on the research themes; (2) attempting to obtain genuine descriptions from the students; (3) protecting the integrity of students; and (4) ensuring that the interviewer stayed focused. Focusing on the research topic meant that though the tone of the interview was friendly, conversational, and used everyday language, the interviewer did not stray too far from the interview topic and themes. Nevertheless, at times it took time for the student to become comfortable at the beginning of the interview and some casual discussion was required. However, the researcher strived for students to give genuine descriptions about their experiences during the course and not be distracted by a nice or comforting conversation. If this occurred, the interviewer used various conversational techniques to return to any themes later if they were missing from the first part of the interview. Protecting students’ integrity meant not encouraging them to talk about things they would regret talking about afterwards.

Following the guidelines given for ethical issues

This research strived to follow ethical principles of research in the humanities and social and behavioral sciences prepared by the National Advisory Board on Research Ethics (2012) in Finland. Ethical principles of research in the humanities and social and behavioral sciences include respecting the autonomy of research subjects, avoiding harm, privacy and data protection. The researcher applied for research permission to conduct this study at the Karelia UAS from the Rector. The director of the study program and the study counselor were aware of and accepted the various measures during the pre-studies, the study,

and data collection. The students were informed that they were participants in a research project, the information they gave would be used in the project, and anonymity was ensured in the research report. Students' information is presented with alternative names, and in some cases personal information that might reveal too much personal information about the students is removed.

6 SEARCH FOR MEDIATORS IN WEB-BASED LEARNING

6.1 Orientation: the students did not speak Vygotskian or Feuersteinian

The researcher performed a preparatory data analysis through Atlas.ti using the theory-driven concepts of mediated learning from Vygotsky (1978) and Feuerstein (1990, 1991). However, the theory driven analysis did not reveal information that would answer the research question. It was difficult to examine the phenomenon of mediation as experienced in web-based learning. The core problem was extracting what information given by students, which could be counted as mediation. After a few readings of the interview material, the researcher felt that a more data-driven analysis was needed in order to build an overall view of all the experiences related to the students' learning experience or how they described things related to their learning. Only after this step could the researcher determine what could be excluded as not referring to mediators and what could be a signal of mediation experienced by the student.

6.2 The research material

The research material consisted of the following material: background information, interview transcripts, and diary assignments. The researcher collected background information from all the first-year students, including the 14 students who participated in this research. The pre-study material comprised 8.5 hours and 101 pages of data. The interview material consisted of 202 pages of transcribed interview data. The interviews were transcribed from 12.5 hours of digital recordings. The researcher received 52 diary text assignments via the IQ Learn diary tool, which consisted of 4 assignments completed by each of the 14 students and four text's via regular email message, while in the beginning one student didn't notice that he could send it via the IQ FORM platform directly. In addition, the researcher used background information from the students, which consisted of a three-page form filled out by each student.

6.3 The reflective character of the students' interview responses

This research targeted students in a course that largely focused on self-reflection and on development of learning skills. When reading the transcribed interviews, the researcher was surprised at the level of reflectiveness in the students'

experiences but understood that the course the students were taking was largely self-reflective. The course content as provided in the IQ Form tutorial and in the assignments aimed at encouraging students to reflect and elaborate thoughts about themselves as learners. The transcribed interviews echoed the reflective character of the course as did the assignments.

6.4 Triangulation using three analysis methods

Data analysis was realized by triangulation using three methods: qualitative clustering, empirical phenomenological analysis, and narrative analysis. Cohen, Manion, and Garrison (2000) define triangulation as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint” p. 112). Triangulation typically involves the use of multiple data sources (Denzin, 2006). The multiple data sources used in this study consisted of the interview material, student assignments written in their personal diaries in IQ Learn, and a background questionnaire collected from each student.

The triangulated data analysis phases are shown in Figure 7 as a triangle with three methods presenting three edges that reinforce and validate the research process.

Figure 7. Triangulation of research methods in the search for mediators in a web-based study.

Leech and Onwuegbuzie (2007, p. 579) advocate for triangulation as a data analysis tool, which is less common. According to them, two major rationales exist for using multiple data analysis tools in qualitative research: *representation and legitimation*. Representation refers “to extract[ing] adequate meaning from the underlying data,” while using multiple qualitative data analyses allows the researcher to “generate more meaning” (Leech and Onwuegbuzie, 2007, p. 259). Legitimation refers to the trustworthiness, credibility, dependability, conformability, and/or transferability of the conclusions made (Leech and Onwuegbuzie, 2007, p. 579). Continuing in this line of thought, one can say that this study saw it necessary to do the following during the analysis phase:

- build a thorough overview and form familiarity with the data found;
- look for complementary or deeper information; and
- to find out if the information found using various methods data was consistent and coherent even if found using a different analysis method.

In this study, triangulation was used to generate more meaning, find the essential meaning of the data, and to legitimate the findings. In an effort to explore more fully the students’ experiences, the researcher used multiple methods to find a full and rich description of web-based mediation. The task was not easy; the researcher had to give up the theory-driven analysis as it could not inform the researcher about experiences that helped students study online.

The aim of the data analysis in this study was to find meaningful experiences concerning mediation as learning support using the most open analysis methods possible. As the analysis was data-driven, multiple methods ensured that various aspects were used in the analysis.

The data analyses were triangulated based on the following aspects.

(1) Clustering in this study

In the beginning of the data analysis phase, the researcher thought the qualitative clustering method would be sufficient, but the clusters did not give enough information to answer the research questions. However, an overview of all the data was needed. Although the clustering phase did not give answers to the research questions, it gave a general idea of all the interview data and it ensured the general circumstances of studying during a web-based course were sufficient for the students to complete the course. Furthermore, it *clarified what the researcher was looking for*. Clustering was used to make the material more visual (Guest & McLellan, 2003) and to ensure the web-based course was feasible for the students. Clustering was helpful to determine the main picture of

the transcribed material, but it did not provide information that would describe experiences with mediation in web-based learning.

(2) Arguments for the benefit of phenomenological analysis in the study

Phenomenology as an analysis method for interview material is different from regular clustering by definition and on closer examination. Phenomenology *does not involve condensation or abstracting; it involves finding the essential*. Kvale (1996) presents phenomenological analysis as one method of qualitative analysis used to analyze interviews. However, he makes no clear difference between Giorgi's (1985) qualitative analysis and the widely used clustering methods presented by Miles and Huberman (1994) and many others. In this study, the leading idea of qualitative clustering analysis was to cover all issues that concerned learning and studying in the course, even if they were not directly connected to the research question, because the researcher observed that it was hard to see what could be important and what not. The aim of the phenomenological analysis was to locate the mediators and how they functioned as a learning support. The phenomenological analysis located five main themes that seemed to refer better to the research questions than the clustering since the researcher aimed to locate essential themes and not just summarize large data into small clusters. However, the researcher was not sure how representative these themes were or if they were genuine. The phenomenological analysis needed to be complemented with further analysis to enlighten the singular individual experiences as a whole in order to see how the themes found in the phenomenological analysis would relate to individual students.

(3) Narrative analysis in the study: validity check and complementarity

The purpose of narrative analysis is to complement and validate clustering and phenomenological analysis findings by *looking at each student using a broader data set*. In addition to the interview transcripts, the data in the narrative analysis also used the texts from students' diary assignments and background information forms. The narrative analysis also investigated the *internal consistency of the students'* information in various data sets. This involved checking students' statements within and between various data sets (interview transcripts, diary assignments, and background data) to ensure the information given by them in interview passages in various data sources was not contradictory.

6.5 Qualitative clustering

6.5.1 Principles of the clustering

The clustering phase demonstrated to the researcher the accuracy of Richards and Richards' (1995) claim that categorizing is never an end by itself. They note that categorizing is rarely recommended merely as a means of tagging all data on a topic. Its goals are often the discovery and ordering of ideas and themes. It involves storing growing understandings, linking ideas to data, cross-referencing, sorting, and clarifying (Richards & Richards, 1995, p. 80). The researcher discovered that clustering was not a sufficient method in this study. Consequently, clustering became the first analysis phase of the study and was followed by other phases.

Clustering uncovered valuable information in this study. Guest & McLellan (2003, pp. 186–189) state that cluster analysis provides a quick and easy visual tool for interpretation and articulating the reasons for clustering “raw” data. They maintain that in many cases, analysis entails negotiating the interplay between raw data, semantic themes or codes, and the overarching conceptual framework (Guest & McLellan, 2003, p. 186). Miles and Huberman (1994) call clustering “the process of inductively forming categories, and the iterative sorting of things—events, actors, processes, settings, sites—into those categories” (p. 249). After clustering, it is important to assess whether the method gave enough information with regard to the research question; according to Berg (2004, p. 251), it is useful to thoroughly analyze the categories.

6.5.2 Forming categories

Kvale (1996, 187) describes five qualitative analysis methods for interviews: 1) meaning condensation; 2) meaning categorization; 3) narrative structuring; 4) meaning interpretation; and 5) generating meaning through ad hoc methods. In the cluster analysis phase of this study, the researcher initially applied the idea of open coding or open thematizing the experiences since the students' statements were first roughly moved to categories. After this initial categorizing phase, the researcher applied coding and categorizing using pre-defined themes. In addition, meaning condensation was used.

Initial categorizing. Kvale and Brinkmann (2004, pp. 201–208) present different methods for meaning analysis: meaning coding, meaning concentration, interpretation, narrative, and ad hoc analysis. This study used coding and concentration to form clusters. First, the statements related to studying in the course were categorized using a very open attitude and ad hoc clustering (Kvale, 2009, p. 203). The statements that appeared important describing the students' learning experience in the course were included in an

Excel table. Even seemingly irrelevant data were included first to ensure its availability, following Miles and Hubermans' (1994) advice about keeping more data available if new questions about the data appear in a later phase. At the same time, the researcher began to form initial clusters and grouped the statements, which could be composed of several sentences, into an Excel table with 317 statements. At this stage, the statements were reduced to 288 because some of the statements were similar to each other. During the initial categorization of the data, each student was given a number and the students' names were altered. In the Excel table containing the data, each statement was attached to the corresponding student's number. In many cases, same kind of statement was given by many students and those students' numbers were attached to those particular statements. The researcher noticed it was necessary to read and re-read the interviews several times to ensure that all relevant statements were observed for categorizing. However, it was clear that categorizing without any pre-set codes was difficult and led to too many categories; at this stage, 26 categories had been found. Since the amount of data was quite large, including the transcripts of 14 interviews, categorizing demanded the use of a coding system.

In his own study investigating grading, Kvale (2009, p. 193) categorized data based on educational literature and pilot interviews. He divided the categories into main dimensions that each had sub-categories. He observed that categorization served several purposes, including structuring the extensive and complex interviews (Kvale, 2009, pp. 193–194).

In this study, the categories were developed during the data analysis, but the process was strongly supported using the interview themes. While forming the initial categories, the researcher found that the categories began to resemble the interview themes. This process was encouraged by Kvale's (2009, 203–205) example in which he used his research pilots and theory to form his main dimensions (categories). In this study, categorizing the data was realized through the main themes of the thematic interviews, and some categories were born during the analysis. The categories were formed based on the main interview themes as presented in Table 5. Four interview themes (studying in the course, transfer, usefulness and meaning of the course, managing studying in the course) formed one category (studying in the course). One interview theme (the most useful IQ Learn tool) led to three categories (IQ Learn tests, IQ Learn tutorial, and IQ Learn tools). Kvale's (2009, 204) example was used as a model for interview theme -based categorizing.

Table 5. Forming categories based on interview themes and data.

Categories formed based on interview themes and data	Interview themes
Understanding the goals of the course	Goals of the course
Reasons for taking the course	Reasons for taking the course
Student's description of himself or herself	Self-knowledge and learning skills
Classroom or web-based course	Classroom or web-based course
Learned during the course	Learned during the course
Studying in the course <u>NOTE:</u> four interview themes formed one category	Studying in the course
	Transfer
	Usefulness and meaning of the course
	Managing studying in the course
Role of the online teacher	Role of the online teacher
Studying with or without online teacher	Studying in this kind of course with or without online teacher
IQ Learn tests	The most useful IQ Learn tool <u>NOTE:</u> the IQ Learn tools formed three categories
IQ Learn tutorial	
IQ Learn diary	

Categorization using pre-set codes reduced the statements to 231, while overlapping statements were reduced into one abstract statement via meaning condensation. The statements were then checked against the interviews again. This process was done several times, which ensures that the data display is a continual iterative process rather than one carried out at the end of data collection (Miles and Huberman, 1994, p. 249). The codes needed to be “calibrated” to be as descriptive as possible for the set of statements included.

6.5.3 Findings of the categorizing phase

After working with the data, the researcher created a table presenting the categories. Nine categories were found using the pre-set codes from the interview themes. The categories were grouped into larger themes and clusters (Table 6). The five clusters based on the nine sub-categories are (1) background, (2) learned during the course, (3) studying in the course, (4) online teacher, and (5) IQ Learn tools.

Table 6. The five clusters found.

FIVE CLUSTERS	NINE SUBCATEGORIES
BACKGROUND	Understanding the educational goals of the course The reason for taking the IQ Learn Course The student's description of himself or herself
LEARNED DURING THE COURSE	Classroom or web-based course Learned during the course
STUDYING IN THE COURSE	Studying in the course Role of the online teacher
ONLINE TEACHER	With or without online teacher
IQ LEARN TOOLS	IQ Learn tests IQ Learn tutorial IQ Learn diary

Cluster 1. Background

The students were interviewed about things that could be described as contextual in order to get background information about the students, but it was also important to make them comfortable in the interview situation. The background-related cluster told the researcher whether the students understood the educational goals of the course, why they took the course, how they described themselves, and if they preferred a classroom or a web-based course for this type of studies. These categories are called background-related because they did not inform the researcher about issues that might answer the research problem of how students were supported in their actual studying process. However, the background cluster provided important contextual information for the researcher, such as whether the students understood the goals of the course. It was also important to know whether they understood the goals of the course through the information given by the online teacher and/or through IQ Learn.

Understanding the goals of the course. All the students understood the goals of the course from the online teacher (14/14), via IQ learn (9/14), or through both channels (9/14). The face-to-face informational event provided by the online teacher at the beginning of the course was an important experience. Overall, the goals of the course were understood better based on the information and email messages from the online teacher than through the web-based IQ Learn system.

Reasons for taking the IQ Learn course. All the students said one of the reasons for taking the course was so they could gain a study credit to be included in their optional studies. For four students, the study credit was not the main reason. Nine students said they also wanted to improve their study skills, such as preparing for exams or coping with test anxiety. Five said the course was different and interesting, and they mentioned as motivation a willingness to try something new and that the course did not require sitting in classroom or memorizing by heart. One student also mentioned the need to increase technological proficiency with the Internet.

The students' description of themselves. Five of the students described themselves as diligent (student nos. 1, 3, 6, 10 and 11) and that they were doing what was expected of them. Four students called themselves lazy or trying to pass school the easy way (student nos. 4, 5, 7, and 13). The students' background was heterogeneous. A half of the students had vocational school background (student nos. 3, 4, 6, 8, 12, 13 and 14) and half of them had high school (student nos. 1, 2, 5, 7, 9, 10 and 11). Two students (student nos. 3 and 6) with vocational school background had some problems with the theoretical demands of their studies. Two students, one with vocational school (student no. 4) and one with high school background (student no. 2), said studying is usually easy for them.

The overall study culture or ethos among the students was not to be overly ambitious; it was more popular to be an average student. However, eight students (student nos. 2, 4, 5, 7, 9, 8, 13, and 14) indicated interest and some talent in computing or math, which were focal subjects in their study programs. The two students who knew that they were good learners, didn't express any will to be the best (student nos. 2 and 4). They could get better grades if they put more effort into studying. Five of the students underlined their leisure time and life outside school as important. There was a clear lack of high motivation, five of the students indicated that if they were interested in the topic their motivation to study was also was higher (2, 3, 4, 7, 8 and 9). None of the students described themselves as very ambitious or striving. However, during the interviews it was obvious that at least half of them were talented in computer studies. Five of the students said that they were mediocre or average students (4, 7, 10, 11, and 12). Two of the students were more adults and had families with children.

Web-course or classroom course. When asked, all students finally preferred a self-regulation course to be taught through the web. Two students said that they might be able to do it by themselves (student nos. 1 and 2). One said it would not be interesting enough for classroom studies, and one said it would be boring with a teacher lecturing. One student said that maybe it would be better if a teacher taught the skills first and afterwards there was work online. However, the main experience was that this kind of course was best realized with someone to guide, set the schedule, and monitor the students.

Cluster 2. Learned at the course

The students improved their self-awareness and learned critical thinking, better reading techniques, and time management. They also learned how to cope with test anxiety and that they must put more effort into their studies. Many students said their awareness about themselves as students increased during the course. Most of them did not learn anything radically new about themselves through the IQ Learn tests, but they gained more awareness about themselves as students when working with the assignments in the tutorial. One said that he hadn't learned anything new, except how to act in social situations (student no. 4, male). One student said the course brought to the surface ideas about how he really was (student no. 7, male). One student obtained reinforcement about her "doubts" as a student (student no. 12, female). Two students said they learned critical thinking (student nos. 1 and 12). Many mentioned learning better reading techniques, especially how to prepare for exams. In addition, time management improved for some students. One student learned advice for social situations, although he said he is still quite shy (student no. 4). Some students learned advice for coping with exam anxiety, and two said they also understood that they must put more effort into studying (Student nos. 13 and 7).

Cluster 3. Studying in the course

Completing the course. Although this was the first web-based course for all but one of the students, all the students but one completed the course. However, this student enrolled in the course at the last moment when the course had already started, and he dropped out after one week. Many (9/14) of the students said their overall study management in the course went well, although five students had some problems meeting deadlines. They left things until the last moment but accomplished them with some delays. Some assignments in tutorial were hard to find as mentioned above.

Being able to study in peace. Four students mentioned being able to study in peace or being able to study on their own (student nos. 1, 2, 3, and 8) as a good experience.

Cluster 4. Online teacher

The fourth cluster indicates that the online teacher can act as a mediator to support students in improving their learning skills and strategies.

The role of the online teacher. The main roles the students saw for the online teacher was a guide, a monitor, or a feedback giver. All the students said the online teacher was not a teacher but rather a guide. The teacher did not help with actual studying. Five students saw the online teacher as a monitor or authority. Five students mentioned the role of the online teacher as a provider of feedback.

With or without an online teacher. When asked, all the students said that they would prefer this kind of web-course with an online teacher. Even those who first said they could study without a teacher said that on second thought, it would be better with a teacher.

Cluster 5. IQ Learn tools

The fifth cluster indicates that the IQ Learn tools can act as mediators to support students in improving their learning skills and strategies.

The IQ Learn tests were experienced mostly as strengthening the students' ideas of themselves as learners. Two students said the tests were the best tool. The tests did not necessarily reveal any new aspects about the students but made them think about their personal strengths and studying habits and any gaps within them.

IQ Learn tutorial assignments. In the assignments, the students needed to analyze themselves, their learning strategies and skills, and what they thought about studying on a deeper level than in the tests. In some students' experience, the tutorial was the best tool; they said it made them think about themselves as learners. Some also thought more broadly about themselves as people.

IQ Learn diary. Writing seemed to be a challenge for some students. Three students said the diary was the best tool. Some students did not indicate a difference between the IQ Learn diary and tutorial (student nos. 2 and 5). Some students (nos. 3, 6, and 13) said the diary motivated them to reflect, although some experienced it only as a platform for assignments.

6.5.4 Reflections and conclusions from the qualitative clustering phase

Of the five clusters found, two indicated mediators that supported the learning process during the course: cluster four (online teacher) and cluster five (IQ Learn tools).

The first cluster about background indicated that students understood the educational aim of the course. This ensured that there were no major problems in the beginning of the course about what the students were about to study. If there had been confusion about the aim of the course, this might have made the students less willing to speak about their experiences with IQ Learn, or they might have had a negative attitude towards studying in the course. Although many students were interested in improving their learning skills, the main reason many students took this course was the study credit, which indicated that the course was an instrument for students to get enough credits for graduation. The student background was very heterogenic as half of the students had a high school background and half had a vocational school or vocational institute background. This led the researcher to think she could expect different reactions to the course content. None of the students described themselves as very ambitious, which was a surprising result.

The second cluster, about what was learned during the course, also provided important information indicating the students thought they had obtained new learning skills. The students indicated the IQ Learn tools had helped them learn.

The third cluster, studying in the course, showed this kind of course was “doable” online in that all students who attended it from the beginning completed it. The students also enjoyed studying on their own. This facilitated the research because if a group of students felt the course was too difficult technically or content-wise, that would have affected the interviews and the research.

The fourth cluster related to the online teacher as a mediator. This cluster showed the online teacher was not an actual teacher in the students’ minds but rather a guide and monitor figure. She was a mediator supporting the students. The aim of the IQ Learn system was to be available for students for self-study and to eliminate the need for an actual teacher. The students could manage their studies without an actual teaching teacher, and the study content was placed in the IQ Learn tutorial.

The fifth cluster indicated the IQ Learn tools acted as mediators during the course. They promoted or supported the learning process of new learning skills and strategies. The conclusion is that the IQ Learn tools can act as mediators to support students in improving their learning skills and strategies. The IQ Learn test sets stimulated the students' thoughts about themselves as learners.

Conclusions of the clustering phase

This basic clustering phase was needed for information about the general content of the students' experiences and it indicated two kinds of mediators: the IQ Learn tools and the online teacher. The cluster "background info" was also valuable, although it did not point out mediators. It provided information about general conditions of studying in the course, such as if the course was doable (although none of the students had completed web courses before and the researcher feared possible technical problems). This was important information because it showed the actual research could focus on the research topic and not be by circumstantial problems from studying online.

Clustering the data was helpful. It gave an idea of the students' experiences during the course. However, some of the clusters did not seem to provide enough insight regarding the purposes of the study.

- Although there were indications that the online teacher and IQ Learn tools acted as mediators, the categorizing process made the researcher think about how the students actually experienced them. Furthermore, the researcher considered whether there were more features of the course that could be described as mediators.
- The categorizing phase helped move the research forward. It clarified and deepened the research process by bringing the researcher closer to the research problem. Because the clustering phase did not provide sufficient information, the researcher was forced to think about the actual mediators during the course that helped students in their learning.

6.6 Continuing the analysis process after clustering

The analysis process was refined after clustering as the Figure 8 shows. The research question about mediators supporting learning of self-regulation remained the same and the research task was advanced during evaluation of the clustering into what, who, or how the students were helped or what kinds of descriptions from the students could lead to the mediators.

Figure 8. Continuing the analysis process after the clustering phase.

6.7 The empirical phenomenological analysis

Creswell (2007) and Kvale (1997) view the phenomenological approach as generally suitable for qualitative analysis. Creswell (2007) also uses the empirical phenomenological method from Moustakas, and he describes Giorgi's method (Moerer-Uhrdal & Creswell, 2004). Kvale (1983) bases much of his thinking on phenomenological philosophical groundings.

6.7.1 Two main types of phenomenological analysis.

Phenomenological methods have been developed for the research in social sciences, psychology, and educational sciences. This development can be seen especially in North-American research such as research of Spiegelberg (1972) Giorgi (1985, 1997, 2009), Moustakas (1990), von Eckhartsberg (1998), and Creswell (2007). However, an ongoing discussion has been conducted regarding descriptive and interpretative phenomenology, in which the former claims to be loyal to Husserl's (1901) tradition of transcendental phenomenology and the latter has developed interpretative phenomenology based on Heidegger's (1977) ideas. Creswell (2007, p. 59) highlights two types of phenomenology: hermeneutical phenomenology (van Manen, 1990) and empirical, transcendental, or psychological phenomenology (Giorgi, 1985; van Kaam, 1966; Colaizzi, 1978). The main differences between these methods are in the amount of interpretation left for researcher during data analysis. The methods also differ from unstructured to structured analysis. Descriptive phenomenology strives to

have a structured data analysis process and to avoid a too interpretative approach and make the research process transparent.

Giorgi (1985, pp. 235–257) states that almost all qualitative methods must go through a minimum of five basic steps: collection of verbal data, reading of the data, breaking of the data into parts, organization and expression of the data from a disciplinary perspective, and synthesis or summary of the data for purposes of communication to the scholarly community. These steps also apply to the phenomenological analysis (Giorgi, 1985). However, Giorgi (1985) presents a way of interpreting each step to make them consistent with the phenomenological approach.

Other empirical phenomenological methods. In the first efforts to use a phenomenological method for the analysis process, the researcher first aimed to conduct the analysis using Moustakas' (1990) phenomenological method and, when not convinced, also sought advice from van Manen's (1991) phenomenology. Moustakas (1994) combines a heuristic research and attitude in his phenomenological method. He suggests that researchers must pay attention to their inner thoughts instead of only trying only to describe what informants say. Due to its many interpretative levels, Moustakas' (1994) method proved to be too complicated for this study. The reservations against this method were confirmed with an article from Giorgi (2006, pp. 311–312) that criticized Moustakas (1994) for letting his understanding of heuristic research influence his understanding of phenomenology. This study tried to find a functional way to conduct analysis using van Manen's (1990) phenomenological method. Although it illuminates the human life-world well, there was no clear way to apply his methodological thoughts to the analytic process in this study. The interpretative hermeneutic phenomenology by van Manen (1990) tries to combine thoughts from Husserl, Heidegger, and Gadamer, which in Giorgi's (2006, p. 314) opinion cannot be done.

Perttula (2000, pp. 428–442) adopts the main principles of Giorgi's method but develops his own method based on existential phenomenology. His method utilizes an approach between descriptive phenomenology and interpretative (or hermeneutic) phenomenology. For this study, the method was deemed too extensive, although it carries the same ideas.

6.7.2 Main characteristics of Giorgi's descriptive phenomenological analysis

This study applies Giorgi's descriptive phenomenological method (1985, 1997, 2009) while aiming to use the most transparent analysis methods possible. This means the analysis process is visible and can easily be followed. For Giorgi (1985), the main idea in phenomenological research is to "describe" the phenomenon as truthfully as possible while refraining from anything pre-defined. Giorgi situates himself within the perspective of Merleau-Ponty's (1962) phenomenological philosophy. According to him, Merleau-Ponty's phenomenology can best be understood in terms of phenomenological method and has four characteristics of phenomenological analysis: *description*, *reduction*, *searching for essences* and *intentionality* (Giorgi, 1985, 42–43, Merleau-Ponty, 1962, p. ix).

Description. According to Giorgi (1985), the initial description phase of the research material should be a naïve description, which means that categories of analysis or explanation do not enter the initial description. This entails according to Giorgi (1985) that the description comes from the original other person, the subject of the research. In his latest (2009, p. 96) book he simply describes that: "These descriptions are given by ordinary persons within the natural attitude".

Reduction. In describing phenomenological reduction, Giorgi (1994) states, "one simply refrains from positing altogether; one looks at the data with the attitude of relative openness" (p. 212). He explains the meaning of reduction thoroughly by clarifying that

not only must we be sure that our theoretical prejudices in terms of analytic or explanatory categories do not enter our initial descriptions—and therefore we bracket them—but we also want to be sure that we do not naively prejudge the nature of our experiences, so we describe them simply as they present themselves and precisely as meanings for us without taking the further step by stating that they are what they present themselves to be, or that they are what they mean to us. (Giorgi, 1985, p. 43)

Searching for essences entails efforts to understand the essence or structure of the descriptions the research participants give. According to Giorgi (1997, pp. 235–260), an essence is the most invariant meaning for a context without which a phenomenon could not present itself as it is. Studying what meanings must necessarily belong to the phenomenon is researched with free imaginative variation (Giorgi, 1985, p. 43). Giorgi explains imaginative variation in many passages, but the most enlightening is in his latest book, where he states that

Free imaginative variation requires that one mentally removes an aspect of the phenomenon that is to be clarified in order to see whether the removal transforms what is presented in an essential way. If what is left appears radically different because of the removal of a part, it can be assumed that it's an essential part of the phenomenon. If it's still recognizable as the same after the removal of a part it is most likely to be a conditional, not part of the phenomenon, i.e. a not essential part. (Giorgi, 2009, pp. 69–70)

If, for example, a chair does not have a seat it is no longer a chair but something else.

Intentionality. According to Giorgi (1985), phenomenology holds that consciousness is always directed or oriented toward something that is not conscious itself. However, when referring to Merleau-Ponty (1962), he notes that the major significance of intentionality is the distinction that Husserl introduced between intentionality of act and operative intentionality (Giorgi, 1985, pp. 43–46). Giorgi maintains that the former refers to reflective level (a position or an attitude towards an object), while the latter refers to a certain intention in an experienced situation. Uncovering the operational intentionality requires a description with the reduction (Giorgi, 1985). With this, Giorgi (1985) must refer to studying descriptions of research participants in order to find their “operational intentions” (pp. 45–46).

Giorgi (1997) states that his method has a psychological perspective as the disciplinary perspective, but he also refers to other possible disciplines. He notes that part of the researcher's task is to introduce appropriate disciplinary terms (psychological, sociological, etc.) in a phenomenologically grounded way. (Giorgi, 1997, pp. 235–260). In this study, the perspective is of educational sciences.

6.7.3 Applying Giorgi's phenomenological steps in this study

Giorgi (1985, pp. 11–19) outlines his method through four key steps:

- (1) Getting a sense of the whole;
- (2) Selecting the meaning units focusing on the phenomenon researched;
- (3) Transforming the everyday expressions into the language of the research; and
- (4) Building a synthesis of the analysis.

The steps in Giorgi's method are described here and include clarification of how they were used in this study.

Getting a sense of the whole

This entails reading a transcribed description of the phenomenon, called *naïve description*, which is what Giorgi (1997) calls the original, unaltered text. The text is read several times without selecting or marking any parts. The reading applies the principles of phenomenological reduction while refraining from a pre-defined position or theoretical explanatory categories (Giorgi, 1997, pp. 235–260; 1985, pp. 10–21, 43–44).

In this study, the students' transcribed interviews were read several times. The researcher aimed to get an idea of how the students spoke about their studying during the web-course. In practical terms, it meant "forgetting" all the categories found during the clustering analysis. This was not a difficult task, since the clustering analysis left so many questions about mediators that the researcher could approach the transcribed texts without any particular expectations or preconceived ideas.

Selecting the meaning units focusing on the phenomenon being researched: Natural meaning units

The second step entailed finding meaning units and describing them in the students' language. At this stage, the important meaning units were marked in the transcribed interviews so their context could be found later. At the end of the second step, a series of meaning units expressed in the subject's everyday language were created. It was important to be loyal to the research participants' original expressions (Giorgi, 1985, pp. 10–21; 1997, pp. 235–260). It was understood in this study that as they were selected based on the perspective of the research, they could be shortened. However, in a recent description of his method (2011, p. 130), Giorgi notes the meaning units created during the second phase carry *no theoretical weight*. They simply make the description of the experience more manageable and help *locate places in the transcription* that are the basis of the transformations the researcher will make in the next step.

The second step of this study involved looking for interesting passages in each transcript from the point of the research question. The researcher kept in mind anything related to factors that supported or helped the students in learning. Theoretical interpretations were avoided, and an effort was made to be loyal to the students' words if possible. In all, 53 meaning units were found. The first column in Appendix D shows the 53 naïve descriptions marked in the interview transcripts to create meaning units found during the second step. They came from full or partial sentences from the students' interview transcripts. According to Giorgi (1975, 1984), the meaning units created based on the students' (naïve) descriptions can be called *natural meaning units*. As an example naïve descriptions and 11 natural meaning units from the second step are presented in

the second column of Table 8. All the 53 natural meaning units from the second step are presented in the second column of Appendix D.

***Transformation of the everyday expressions into the language of the research:
General meaning units***

The third step entailed describing the meaning units from the second step on a more general level with the research perspective in mind. This included elaborating on the natural language in the second meaning units to remove repetitions and anything else irrelevant to the point of this study. This was done through careful writing and rewriting, and the researcher used imaginative variation to achieve general meaning units.

At this stage, it is important to note that Giorgi's (1985) steps have been adapted for their own use by researchers such as Wertz (1983) and Perttula (2000). In particular, the second and third steps have been understood and used in different ways. Perttula (1995a, 2000, pp. 428–442) rewrites individual experiences to more general descriptions already during the second step. But, he emphasizes that that it is important that the analysis stays in immediate contact with individual data and the network of individual meaning units" (Perttula, 2000, p. 432). Wertz (1983, pp. 194–241, 1985, 164–178) thematizes the individual meaning units during the third step, although it is difficult to fully compare his steps to Giorgi's steps. Wertz (1985) states that he follows Giorgi's steps "more or less" (p. 164). Even though Wertz's analysis process differs from Giorgi's original process, he emphasizes that Giorgi's process outlined the steps present in phenomenologically oriented psychological research (Wertz, 1985, p. 160). The value of Perttula's and Wertz's analysis processes lies in their respect for individual lived experiences, which is visible in their detailed analysis processes.

The researcher used Giorgi's basic steps in this study because his original description of the steps fills the needs of this study (Giorgi, 1985, pp. 11–19, 1997, pp. 235–260). The third step was also assisted by Giorgi's (2009) recent remarks on his method, where he stresses the following points.

- Imaginative variation must be used in the analysis process in order to reach a higher level of categories (Giorgi, 2009, p. 131)
- A certain level of invariance of the meanings must be reached. Even if the psychological meanings are context-sensitive, they can be expressed in such a way that data from several research participants' can be integrated with them (Giorgi, 2011, p. 132).

The third step needs “dwelling,” which means writing, rewriting, and exploring in order to find the best expression. Giorgi clarifies that one has to dwell with the data, change and vary it imaginatively. This includes imagining the opposite of what one might desire to express, until one finds an expression that is suitable. The researcher might need to write several versions before achieving the desired expression. (2009, p. 132)

- Giorgi (2009) remarks, that “Sometimes an important implicit psychological meaning is not stated anywhere, but it has a strong background presence so one has to make it explicit somewhere and a relevant meaning unit is chosen to do that” (p.132). Furthermore he notes, that “there may be a repetitive theme, the psychological sense of which is critical” (p. 134).

As mentioned before, Giorgi stated that the third step entails writing several versions. In this study, the researcher also wrote several versions before arriving at 11 general meaning units through imaginative variation, as the examples will show. In his recent book (2009, 143–154) he has also given an example of the writing process of third step in which he elaborates the text in order to arrive at a generalized level. His writing process has in many cases required three sets, during which the text is “transformed” during the third step. However, it was found in this study, that the 53 natural meaning units from the second step could be written into 53 *still individual, but generalized, meaning units* during the third step. By first creating individual generalized meaning units, the researcher aimed to keep the analysis process as transparent and traceable as possible in order to show this study’s writing process. Based on grouping the 53 individual generalized meaning units with imaginative variation as will be clarified in the example 1, the 11 generalized meaning units could be generated.

The following example (Example 1) and Figure 9 illustrates how the general meaning units were created. In addition, Table 8 shows examples of the phenomenological analysis steps, how the general meaning units were formed and Table in Appendix D provides all the cases. During the step 3 they were then transformed into individual generalized statements and thematized into 11 generalized meaning units.

Example 1. An example of the analysis process (Figure 9) illustrates how the first general meaning unit (“Could choose when to study”) was reached by reading Antero’s (one of the students) interview transcript, how the natural meaning unit was formed during the second step, and how the general meaning unit was formed during the third step of analysis. The analysis process illustrated in Figure 9 was repeated with each of the 53 natural meaning units until the 11 general meaning units were found. However, imaginative variation was necessary in order to ensure which general meaning units were needed.

Figure 9 demonstrates the following items:

- how Antero's interview excerpt included the naïve description, which was read during the first step: "Antero: ...it is in a way nice in that way, that one doesn't need to be... well go there regularly. That one can accomplish it on one's own time...";
- how, during the second step, this description became the natural meaning unit: "Antero said he enjoyed the fact that he could choose when to study";
- how this became an individual generalized statement during the third step: "Antero liked studying and accomplishing the study tasks at his own pace"; and
- how this individual, generalized statement was one of three individual general meaning units (Antero, Pekka and Riina; for all the individual general meaning units, see Appendix D) that formed the first general meaning unit: "Could choose when to study" as illustrated in the Figure 9.

Figure 9. The descriptive phenomenological analysis: Creating the first general meaning unit "Could choose when to study".

Forming general meaning units also required imaginative variation. General meaning units are referred to as the students' *essential experiences* since they represent the students' experiences during the course in a non-repetitive and non-overlapping sense. The general meaning units are presented in Table 7.

Table 7. General meaning units (students' essential experiences).

1. Could choose when to study
2. Could study when the mood was right
3. Being able to concentrate
4. Enjoying informal studying
5. Having privacy for personal expression
6. Online teacher as trusted
7. Online teacher as guide
8. Online teacher as monitor
9. Tests provide knowledge about self as learner
10. Tutorial make student analyze self as learner
11. Diary make student produce own thoughts

Exploring the imaginative variations of step three. The researcher was not sure how many general meaning units would cover the students' experiences. Imaginative variation involves looking for necessary "new" information in each meaning unit compared to another meaning unit and what separates them from each other. All the general meaning units were derived through a reflective process to determine *the necessary information included in them that was not included in another meaning unit*. The aim was that one meaning unit should not be too interpretative. The most important reflections are presented here.

- Was it necessary to have separate general meaning units for "could choose when to study" and "could study when the mood was right" or should there be only one general meaning unit for those categories? When reading the transcripts again and comparing interview passages in which students talked about timing, the researcher ensured that it was appropriate to have two meaning units for timing. The first one underlined the students' *freedom to choose* the time when they wanted and the second one highlighted the students' *situational mood*. The researcher used imaginative variation by testing how the meaning unit looked and left out the mood, but information was lost since the students spoke about how their mood helped their studying.

- Likewise, the researcher reflected on whether both meaning units “being able to concentrate” and “having privacy for personal expression” were needed. The general meaning unit “being able to concentrate” was based on interview texts (and natural meaning units were created based on them) in which students used the everyday expression “studying in peace.” However, the general meaning unit “having privacy for personal expression” was based on interview texts and everyday expressions in which the students used the expressions “private place,” “personal things,” and “own stuff.”
- Furthermore, the researcher thought about whether both general meaning units “tutorial make student analyze self as learner” and “diary make student produce own thoughts” were needed. Was there any difference between analyzing and producing in this context? The meaning unit “tutorials make student analyze self as learner” was based on expressions such as “analyzing,” “reflecting,” and “deepening,” which were used by the students. Although the students also used these words when talking about the diary, they emphasized that the diary *made them think and write*. The diary was an engine for writing.

Building a synthesis of the analysis

The fourth step is about expressing the structure of the phenomenon. Giorgi (1997, pp. 235–260) describes, that during the fourth step the general meaning units gained during the third step are undergoing “more or less” the same procedure as the meaning units during the third step. The aim is to determine what is essential and what is not. Giorgi calls the fourth step synthesized structure or results. He also remarks that researchers can create several structures that can be understood as essences and their relationships. He maintains that the importance of structures is not the parts, as such, but the interrelationship among the parts. Moreover, Giorgi (1997) claims that “structures are not ends in themselves” (p. 253), rather they represent “measures of central tendency” (p. 254). (Giorgi, 1997, pp. 235–260).

In this study the transformed general meaning units gained during the third step were synthesized into a consistent statement for the research results. They were re-described in order to determine what was essential. Again, as during the third step, the students’ lived experiences were defined with the help of free imaginative variation from the research perspective. The researcher made a synthesis of the analysis to produce five meta-level themes. The metalevel themes found were the mediator of *own pace*, the mediator of *own space*, the mediator of *own face*, *human* and *tool* mediators.

The 11 different kinds of general meaning units described the students' experiences on a generalized level, but a synthesis was necessary from the point of the research question, i.e., finding metalevel expressions about the mediators that supported the students' learning process. The research question led the way during this analytical steps as the researcher asked, what were the metalevel structures behind these generalized experiences. The mediators and the general meaning units (essential experiences) of the learners are presented as follows.

- *Own pace.* The experiences “could choose when to study” and “could study when the mood was right” indicate that something related to controlling one's own time could be a mediator. This mediator was referred to as *own pace*.
- *Own space.* The experiences “being able to concentrate” and “enjoying informal studying” indicate that something made the environment positive for them. This mediator was referred to as *own space*.
- *Own face.* The experience “having privacy for expression of personal thoughts” was created based on expressions in which the students mentioned enjoying the discretion web-based studying offered them in comparison with studying in a classroom. This mediator was referred to as *own face*.
- *Human mediator.* The experiences “online teacher as trusted,” “online teacher as guide,” and “online teacher as monitor” all pointed at the role of human support during the course.
- *Tool mediator.* The experiences “tests provide knowledge about self as learner,” “tutorial make student analyze self as learner,” and “diary make student produce own thoughts” all pointed at the role of tool support during the course.

In order to make the analysis procedure visible, the step-by-step process needs to be studied from first to the fourth step in the Table 8. The *imaginative variation* used to define the five metalevel themes is describes after Table 8.

In addition to the presentation of a table 8, the mediators found need to be related to the student's original expressions. As Giorgi (2007) remarks “once the structure has been delineated, one has to go back to the raw data and render intelligible the clusters of variation that are also contained in the data” (p. 253). The mediators are going to be presented in connection to the “raw data”, (excerpts from the interview transcripts) in the main Chapter 7. (The mediators supporting learning).

Table 8. Phenomenological analysis steps, general meaning units and mediators.
(For the full table of analysis, during steps 1–3, see Appendix D.)

1 st step NAÏVE DESCRIPTION	2 nd step NATURAL MEANING UNITS	3 rd step GENERAL MEANING UNITS	4th step
			MEDIATORS
Parts of the naïve description of the 1 st step selected for the second phase.	Description based on the student's language	Non-bolded text: Individual generalized meaning units	
Antero: ... In a way, it is nice that you don't have to perform... go there regularly. That you can do it at your own pace... (Student no. 11, male, 6/16)	Antero said that he enjoyed the fact being able to complete the study tasks at his own pace.	1. Could choose when to study. Antero liked studying and accomplishing the study task at his own pace.	OWN PACE
Jaana: First it was quite difficult, while I'm very bad in creating any kind of text. (...) ...and then that one first had to be in right mood...anyway so that I could have it written. [5/13] (...)Well...it was good that you could do it whenever you felt like it, right when you were most inspired to produce text. [6/13] (Student no. 13, female)	Jaana said that she had to be in the right mood in order to be able to write. It was good being able to study exactly when she felt inspired to produce text.	2. Could study when the mood was right. Jaana had to be in the right mood in order to be able to write. She appreciated being able to study exactly when she was inspired to produce text.	
Mika: If you had tried to do this at school, there would have been all kinds of interruptions, but at home it was easier to think. (Student no. 2, male, 9/11)	Mika said that if he tried to do this in school there were all kind of interruptions, but at home one it was easier to think.	3. Possibility to concentrate According to Mika, there are interruptions at school, but it was easier to think at home.	
Riina: Willingness to try new things. It could be worse [this kind of course in a classroom] because then it is very school-like again. That you have to sort of sit in the theory classes before you get to do the hands-on part. (Student no. 3, 2/13)	Riina said it can be worse [this kind of course in a classroom], because then it is school-like again.	4. Possibility for informal studying. Riina said it can be worse [to have this kind of course in a classroom], because then it is school-like again.	OWN SPACE
Raimo: When I did this at home in my own world... Well, it was easier to fully concentrate on it. [11/14] (...) ..in a regular classroom course, you can't think about this kind of personal stuff and feelings in peace. (...) [14/14] (Student no. 5, male)	Raimo said in a regular classroom course he can't think about this kind of own stuff and feelings in peace.	5. Having privacy for expression of personal thoughts In Raimo's view, he cannot think about his personal issues and feelings in a classroom course in peace.	OWN FACE

Anna: ...It was maybe a little easier to write than if there had been a teacher who is...who you know really well and who is always there, so... [6/16] (...) There are some teachers you wouldn't like to do this with. [7/16]. (Student no. 1, female)	Anna said it was a little easier to write when it was not a teacher she knew. There are some teachers, with whom she wouldn't like to study this kind of course. (Student no. 1, female, 7/16)	6. Online teacher as trusted Anna liked the fact that she wrote to a person who she did not know personally and who was not there every day [in her regular school].	HUMAN SUPPORT
Antero: Well, it's more like a guide or someone like that who is saying what needs to be done and you can ask questions if you need it, if you don't understand something or don't know how to do it. (Student no. 11, male, 7/15)	In Antero's mind, the online teacher was a guide telling what needs to be done and an adviser if one doesn't understand what to do.	7. Online teacher as guide Antero saw the online teacher as a guide and adviser if the student had problems.	
Pekka: In my case, I sort of had to...well, in my case the teacher has to...the online teacher, she has to tell me to do it. If she isn't telling me what the requirements are... I wouldn't do any of it. Now, there were deadlines and criteria on how much you had to write. That sort of helped... (Student no. 7, male, 14/18)	In Pekka's case, the online teacher has to require that the work has to be done. Otherwise he will do nothing.	8. Online teacher as monitor In Pekka's case, the online teacher has to require that the work has to be done. Otherwise, he will not do anything.	
Kai: one can discover things via them [the tests]. [7/11](...). Well, maybe the tests were the most useful. ... doing the tests makes one to focus most [on the task when compared with working with the tutorial or diary]... [11/11] (Student no. 14, male)	Kai said that he had to focus most with the tests and he discovered things via the test results.	9. Tests: providing knowledge of self as learner Kai stated that the tests were the best tool. He discovered things through the results and had to focus most when making the tests.	TOOL SUPPORT
Anna: Assignments made me analyze or reflect on myself after the tests. (15/16). (...)...When you had to think about those things, many other things came up. (...). For example, this critical thinking, so, well, when I did that assignment these kind of things popped into my mind. You noticed that, un-huh, I'm like this and that... Some of my personal features, like how I thought about things and such ...	Assignments made Anna analyze or reflect about herself after the tests. Many things came up, when she made the assignments, for example critical thinking.	10. Tutorial: make student analyze self as learner. Anna said the tutorial assignments made her analyze and reflect as many things came up, for example critical thinking.	
Jaana: When I first tried to write, nothing came out, but it was much better the next time.)(...) Well, you might be reflecting on it subconsciously... (...) and then another day it just comes out better and you write the text. So that's not just like whoops. (Student no. 13, 5/13)	Jaana said nothing came out of it, when she first tried to write. The thoughts had to mature before writing as they didn't appear easy or at once	11. Diary: make student produce own thoughts According to Jaana the thoughts had to mature before writing. They didn't appear easy or at once	

Imaginative variation was necessary also during step four. The researcher explored, how the essential experiences found during the third step could be synthesized into general themes to address the research question. For example, the researcher reflected on where to put the need for privacy expressed by the students. In order to make the right decision, the researcher went back to the third step of analysis, which produced 11 general meaning units from the natural meaning units in the second step. Imaginative variation about the themes meant mentally testing the various options of the final themes. This meant reflecting on whether the five themes were strong enough to stand unaided or if they overlapped too much. The researcher also reflected on whether the theme *own face* was necessary. It entailed having the possibility of expressing one's personal thoughts. Was this kind of theme necessary to describe the supporters of learning during the course? Was there more to it than having a private space? If not, it would mean this experience of support belonged to the theme *own space*. The *own face* mediator highlighted the possibility of privacy as a separate thing, even if the possibility of privacy could also be part of the *own space* theme. However, it may not receive enough attention if it were there. As can be seen in Table in Appendix D (General Meaning Unit 5: "having privacy for expression of personal thoughts"), the students used the expressions "private" and "personal" to refer to the supporter of the individual person's integrity. The researcher also reflected on where to put the general meaning unit "teacher as monitor" and whether it should be under the theme *own pace* because it helped students in self-pacing. However, having the teacher as a monitor added a new dimension to mediating the students learning because it helped the students with their own pacing through another human being. On the other hand, monitoring one's own time stemmed more from having a teacher as a monitor.

6.7.4 Results based on the phenomenological analysis

Giorgi (1997) concludes that “the ultimate outcome of phenomenological scientific analyses is not just the ‘essential structure’ but rather the structure in relation to the varied manifestations of an essential identity” (p. 254). The five structures found in this study, own pace, own space, own face, tool and human mediator, can be understood as essences – each informing what kind of learning support the students experienced. Figure 10 shows the five mediators created based on the essential experiences in the third phase. *The five mediators form a multidimensional idea of how learning can be supported.* All the mediators have their own task promoting the learning process of the student. The five themes found can be viewed as mediators of learning support; this will be demonstrated with additional examples in the next main chapter (Chapter 7. The mediators supporting learning) as mentioned earlier.

Figure 10. The five mediators created based on the students' essential experiences.

6.7.5 The validity of the descriptive phenomenological method

When discussing whether descriptive phenomenological analysis can be trusted, Giorgi (1985, pp. 47–49) presents two criteria: (1) the method must be descriptive in the sense that the original, naïve descriptions come from another human being; and (2) the method must be reductive. By this, he means the experience the subject describes is always naïve, but the phenomenological researcher analyses it by reducing the inessential. The psychologist (as he calls the researcher) must understand the research subject, and the subject describes her subjective experience as he or she experienced it (Giorgi, 1985). However,

the phenomenologist must find the essential. Even if a clear difference exists between the roles of the researcher and the research subject, the description may still be of service to the research consciously or unconsciously (Giorgi, 1985). To avoid any conscious promotion of theory, Giorgi (1985) highlights the importance of obtaining interview material from naïve interview participants *who do not know* about the researcher's possible expectations or predispositions concerning the research.

Two issues speak for the non-tactical approach of this research. First, the students were told that the aim of the research in this study was to further develop the course environment which was not the aim of this research. Second, the researcher had no clear idea for the kinds of mediators that would be found during the phenomenological analysis except the obvious ones, i.e., the human and tool mediators. Concerning these mediators, the researcher did not know what would mark them as mediators before the phenomenological analysis. Naturally, the researcher had an idea that the human mediator would act as guide and monitor, but how and what this entailed was unclear. In addition, the element of teacher as trusted was unexpected due to the limited amount of communication between the online teacher and the students.

6.7.6 Confirming the mediators found

The phenomenological analysis brought clarity to the students' experiences, while with the meta-level themes they were divided into various groups. The mediators and the triggers behind these experiences were found. However, the synthesis of the phenomenological analysis results is presented in result chapter, which will integrate the knowledge reached. The purpose of this is to show that the experiences and the main themes formed from them reflected the experiences of individual students. What did the students have during the course to support them, and what kinds of mediators were found?

- The clustering analysis results were also observed and provided some background information concerning the students. This information was helpful and indicated the two mediators, *human* and *tool*, that were found in the clustering phase.
- The researcher then decided to make a *narrative analysis* for each student with the material available. It was necessary to look at each student as a whole to determine his or her story and how consistent the experiences described in the interviews were with the experiences that led to the mediators.

The narrative analysis of the students was conducted using the interviews. In addition, the diary texts from the students and the background information provided by them were included in the narrative data. This process is presented in section 6.7.

6.7.7 Reflections about investigating mediation using the phenomenological analysis method: What did the students experience?

While exploring what kinds of mediators can be found in web-based learning, this study found that analyzing the data required using Giorgi's (1985) phenomenological method for two reasons. First, as mentioned earlier, the theory-driven analysis based on Vygotsky's (1978) and Feuerstein's (1990, 1991) theories using Atlas.Ti and the clustering analysis did not provide the searched-for insights on mediators. Second, the researcher needed to study how mediation was experienced without any predefined ideas. The value of Feuerstein's (1990, 1991) theory of mediated learning experiences (MLE) is that it directs attention to the quality of mediation. However, Feuerstein's criteria for high quality mediation presented in the theory is not used to investigate mediators in this study. As mentioned earlier, Kozulin (2003) observes that research brings forth and emphasizes mediators other than those Feuerstein has presented (pp. 19–23). After the clustering phase, the research question was developed through examining what kinds of descriptions provided by the students could lead to the mediators. The researcher found that Giorgi's (1985) empirical phenomenological method filled this study's need to determine what the students experienced while an exploratory analysis without any pre-defined theoretical assumptions was needed. Furthermore, it allowed a systematic analysis about what the students actually experienced concerning learning support.

What did the students experience, or what can be counted as experience?

The students did not necessarily experience and describe mediators as such. The synthesis generated by the phenomenological analysis led to what Giorgi (1985, 2009) calls "structures," which in this study are the *own pace*, *own space*, *own face*, *human* and *tool* mediators. The students described their experiences in their own words without knowing the research purpose, and the 11 generalized meaning units from the third step described their experiences but were not regarded as the final aim of the research (i.e., what types of meta-level expressions illustrate the mediators that describe how learning is supported). These expressions do not yet clarify the full meaning of the experiences *on a meta-level*. For example, the two first general meaning units found in this analysis during the third step ("could choose when to study" and "could study when the mood was right") are not yet meta-level expressions of the students' experiences. They have an implicit meaning related to timing or pacing the

studies. Giorgi's method urges synthesizing the results in the research language. The experiences listed as general meaning units in the third phase *indicate mediators on a concrete, everyday level* but do not represent a theoretical idea of mediators yet. The synthesizing process of the fourth step brought the metalevel theme or structure common for this two first general meaning units, *own pace*. Own pace is one of the five structures, or metalevel themes found in this study. In discussing how to produce a structure describing the phenomena investigated and describing the fourth step of analysis, Giorgi (2009) remarks that "one has to remember here that structure is meant to be a psychological one that reveals the psychological aspect of the experience in a heightened way" (p. 103). Furthermore, Giorgi (2009) maintains that "the goal, however, is to make as explicit as possible the psychological aspect of the phenomena being investigated" (p. 104). The "psychological" aspect denotes the educational aspect in this study, i.e., the aspect regarding the kinds of mediators that supported the students. The synthesis of the analysis can be described by one or several structures according to Giorgi (2009, p. 103). Moreover, Giorgi (2009) states that in some cases, the data can be fitted under one single structure; he calls variations among the data "intrastructural variability" (p. 103). In other cases, the data must be expressed with several structures; the variations between these structures are called "interstructural variability" (Giorgi, 2009, p.103).

The mediators found in this study could not be fitted under the same structure because they indicate different kinds of mediators supporting the students. However, together they form an interstructural variability that builds a multidimensional idea of the tasks and types of mediators in the digital settings of the course investigated here.

The life-world of the students during the course. As noted in section 6.3, this research targeted students in a course that largely focused on self-reflection on or self-development of learning skills, and as mentioned earlier the transcribed interviews echoed the reflective character of the course. However, the aim of the research was to trace what helped the students in their study processes, what kinds of mediators helped them. The research strived to look beyond discourse on learning self-regulative skills and strategies and regarded the learning content present in the same manner as any other learning content; in this study, the focus was on finding mediators. The aim of the research was not to evaluate the learnings skills students gained during the course or how "good" the students were at reflecting on themselves as learners. The aim was to trace what helped the students in their study processes. For this reason, the researcher was not concerned about the reflectiveness shown in the students' accounts. The students' "life-world" studied here contained the students' experiences of doing, studying and learning during the course; in addition, the students described what supported them during studying. These descriptions indicated mediators.

This study found that only via the *phenomenological method, including reducing the focus on course content and the students' learning tasks* and increasing the focus on essential experiences, was information found on how the students' learning was supported. The researcher aimed to build an unbiased, broad view of how the mediators worked while students studied on their own outside a classroom setting and without a face-to-face teacher. The researcher did not use the phenomenological method without first trying theory-driven analysis and cluster analysis; these two types of analysis did not provide a deeper view of the students' experiences. Many issues and experiences raised by the students became visible through the phenomenological analysis. These experiences, such as being able to choose when to study, the ability to concentrate, having privacy to express their personal thoughts, and/or trusting the teacher, directed the researcher's attention to *new dimensions of mediators*.

6.8 The narrative profiles complementing the phenomenological findings

During the phenomenological analysis, the essential experiences were found based on the students' interview transcripts. However, while reading and re-reading the interviews, the researcher began to see individual pieces of information that were related to singular students. This led to the idea that the student's own experience might be neglected if the messages of these stories, however small, were not studied (Connelly & Clandinin, 2000). The researcher concluded that the individual student as a whole needed to be studied.

The narrative method was not adopted in the data collection phase, and the data did not include deep personal narratives. However, the aim of narrative analysis in this study was not an end in itself. Its role was rather to complement what the conclusions of the clustering and phenomenological analysis. For example, some students made unclear statements during the interviews, which left the researcher unsure about what they really meant. The researcher thought there was a risk that some information may be ignored or misunderstood and that a student might use the same expression as another student but mean something else. For example, if a student said they enjoyed working on their own, it could mean he or she was shy or cautious or that he or she was easily distracted. In order to find out the original meaning of each students' experiences, the researcher thought it was useful to look at each student as individuals and examine their individual statements.

Kvale (1996) describes the narrative approach to interviews as entailing "a condensation or a reconstruction of the many tales told by the different subjects into a richer, more condensed and coherent story than the scattered stories of the separate interviewees" (p. 199). Labov (1972, pp. 363–370) states that

interview material can be viewed as a narrative and that each interview can include small stories that can be reduced to “core narratives.” The main sources for the narrative analysis in this study are Riessman (2008), Miller (1991, 2012) and Lieblich and Seidman (1998).

6.8.1 Thematic narrative analysis

This study applies the thematic narrative (Riessman 2008, p. 53–76), where the content is the focus of the analysis. Riessman states that key issues in narrative analysis are (1) defining the narrative, (2) how the narrative is presented, (3) the unit of analysis (or focus), and (4) attention to contexts.

In this study, the narrative is *defined* as interview segments, parts of the students’ diaries, or information given by the students in the background information form. According to Riessman (2008), thematic analysis can be applied to stories that develop during interviews or are found in a written document. In order to obtain full information from each singular student, the narrative analyses extended the data sources while, in addition to interview transcripts, narrative material was drawn from written observations by the researcher gained from the interviews, diary texts from the students, and the students’ responses on the background questionnaire

The narratives are *presented* as narrative summaries i.e. profiles each of students in this study. Basing on Williams’, Ewick and Silbey’s, Tamboukou’s and Cain’s views on how narrative can be presented Riessman (2008, 75) presents a table summarizing the forms, by which a narrative can be presented. Narratives can be lengthy interview excerpts, cleaned up speech, brief interview excerpts, segment of document, or written reconstructions from memory (observations) and summaries of interviews (Riessman, 2008, 75). Although a narrative is mostly understood as something the interviewee has said, it can also be a construction of the researcher (Seidman, 1998; Miller, 2008). In this study, the researcher paid attention to the individual context of the student by building a narrative profile for each student. The narrative summaries were constructed using ideas from Seidman (1998) and Miller (1991; 2012). Seidman (1998) recommends crafting profiles for interview participants’ experiences as means of making sense of the interview data “while opening up one’s interview material to interpretation and analysis” (p. 102). While building a narrative profile, Seidman first identifies and synthesizes the basic story line by reducing the text to those elements seen as important parts of the person’s story.

This study uses each singular student as a *unit of analysis*. In order to find the “story” of what supported the students when studying, the researcher created a narrative summary for the students. The study is paying attention to the students’ *personal contexts*, but only to the extent the data allows.

6.8.2 Presenting narratives as profiles

Miller's idea and argumentation for building narrative profiles was used in this study. Miller (1991) built narrative profiles when she was not satisfied with the regular coding and categorizing of data when she investigated adolescents' friendships using interviews. When analyzing adolescents' friendships, Miller began her analysis by formulating coding categories, coding the data, and constructing matrices. She stated that two pressing issues emerged: (1) extensive overlap of data occurred between the cells of the matrices and (2) an essential aspect of the data was missing; namely, the *narrative nature* of the adolescents' accounts of their friendships. She states,

In their interviews, the adolescents did not offer isolated bits of information about their friends. Instead, what I heard were the stories of their relationships with their friends. As adolescents talked about their friends and explained why their friendships were important, they described their shared past and created a context from which to understand their relationship. This narrative quality of the data, and its implications for understanding their relationships, were lost in the process of coding and of creating the matrices. (Miller, 2012, p. 122)

In order to deal with the limitations of the matrices, and to capture the narrative quality of the data, Miller constructed narrative summaries. She clarifies that the summaries were narrative in that they sought to preserve the context and story of the relationships. However, they were still summaries since they were her own analytic "abridgements." Her narrative summaries included extensive quotes from the data, but she also reorganized the data to reach what she called a "concise account of the friendship narrative" (Miller 2012, p. 122).

...this led to more depth within the concepts represented in the matrices; the category of closeness between friends, for example, was contextualized. By holding the narrative summaries against the matrices, I could track the meaning of closeness across different friendships for a particular adolescent or between adolescents, or trace its significance throughout a particular friendship. (Miller, 2012, p. 122)

Miller (2012, p. 122) remarks that neither categorizing nor narrative analysis *alone* could have provided the research results. She maintains that she needed to look more closely at their relationships in light of her understanding of the larger context of that friendship. She concludes that the narrative analysis led to more depth within the concepts represented in the clustering analysis.

The narrative profiles in this study were constructed based on Seidman's (2008) and Miller's (1991, 2012) ideas. Similar to Miller (2012), the researcher was not sure whether some essential element of the data was missing or whether

she had found the right phenomenological meaning units to describe the students' experiences. The aim was to *make sense of the data* as a whole using the individual participants' experiences of learning support.

In seeking to preserve the context of singular students, the researcher strived to find the core meanings or core experiences of each student during their study using IQ Learn. The narrative profiles are also summaries based on the researcher's observations about the student made during the interview, the background information given by the students in the beginning of the school year, the interviews, and the diary assignment texts. The profile includes information about the students' educational backgrounds (high school, vocational school, vocational institute, other), how they described themselves as learners, and their main experiences as related to the course. The summaries were also coded partly based on the prior analyses as well as on the issues not systematically observed in the earlier phases of analysis. These issues include for example the following: Education, indicating the students' educational backgrounds; Impression, indicating the interviewer's impression of the students during the interviews; and Important, indicating any other particularly important item(s) related to the point of the research the student said about his/her experiences during the course. All the codes used in the narrative summaries are presented in Table 9.

Table 9. Codes used in narrative summaries.

ED = Educational background
IMPR = Interviewer's impression of the student
WHY = Reason for taking the course
BACKGR = Referring to the background questionnaire as the source
DIARY = Referring to the diary as the source
SELF = Student's description of himself or herself as student
LEARN = What the student learned during the course
TOOL = Experiences with the IQ Learn tools (tests, tutorial, diary)
HUMAN = Experience with the online teacher
IMPORTANT = Item(s) of importance said by the student

When preparing the narrative summaries researcher went back to the original interviews and strived to find the most meaningful passages describing singular student's experiences of learning support. The researcher also read the diary assignments and background information forms from the students. Table 10 displays part of Riina's narrative profile. In addition, some direct quotations of what the students originally said were included in these profile summaries. Two examples of narrative profiles can be found in Appendix E.

The example presented in Table 10 illustrates how the narrative analysis can support the phenomenological analysis results. During the course, Riina used the diary tool efficiently to learn to express her thoughts in writing. The narrative profile summarizes information from the interviews, diary texts, and background information to build an idea of the students as individuals who emphasized certain things during the interviews, in the diary texts, and on the background information forms. In Riina's case, it shows how Riina expressed in the interview how hard it was for her to get good grades in theoretical subjects. The narrative analysis looked at her diary texts and background information. In the diary texts, she also talked about her difficulties studying. However, the diary also shows that she elaborated on her reflections on herself as student by writing that she should question what teachers say more and not only remember what teachers say but also find things out for herself in books and on the Internet. In the interview, she stated that the diary was the best IQ Learn tool because it made her think about what she could learn and how.

Table 10. Example of the narrative summary.

Phenomenological result TOOL AS MEDIATOR Diary: make student produce own thoughts
<p>FROM RIINA'S NARRATIVE PROFILE: The codes are found in Table 9.</p> <p>Student no. 3: The course made the practice-oriented student think</p> <p>ED: Riina found theoretical subjects very difficult even though she received average grades with hard work and below average grades in others. She had no high school background, but she did complete commercial school (Kauppaoppilaitos).</p> <p>WHY: She said she took the course because she was curious and always wanted to try new things. She also liked the possibility of gaining a study credit.</p> <p>IMPR: Riina seemed to be a very social and amiable student who, after finishing her first year at a new school, was afraid of some of the demands at the school.</p> <p>SELF: Riina described herself as an industrious student who wanted to be part of everything. She said she was a practice-oriented student and that she was not at all fond of theory.</p> <p>DIARY: The diary revealed that she was persistent and worked hard, even if she got low grades in some subjects, such as languages. In addition, she wrote that she should question things teachers say more, learn things from books and the Internet and not just remember things teachers have told her.</p> <p>BACKR: The background information Riina provided at the beginning of this course showed that she believed in herself more when she entered NKTUAS during the Fall semester than she did in the Spring semester.</p> <p>LEARN: Riina said that during the course, her knowledge of herself increased and she learned to trust her own skills more.</p> <p>TOOLS: Her test preparation skills also improved.</p> <p>IMPORTANT: Riina said that she first thought she could not produce text however, after two days of reflection, the student course made her think. Once she got started, she was ready write. She considers a traditional school course in this topic worse than a course online, because it is so 'school-like' and first focuses on theory and then practice. The online course was better. Riina said she came to appreciate theory during this course; the course made her think that she could possibly study differently and that theory, and not just practice, is meaningful.</p> <p>Riina: It could be worse [taking this kind of course in a classroom] because then it is very school-like again. That you have to sort of sit in the theory classes before you get to do the hands-on part.</p>

6.8.3 The conclusions of the narrative analysis

Once the narrative profiles of each student were constructed, it was possible to compare the information in the profiles with the phenomenological analysis findings. The narrative analysis offered complementarity and reinforcement for the qualitative cluster analysis and thematic phenomenological analysis findings. However, *it did not change* the findings from the phenomenological analysis. In

the narrative analysis, each student was examined as a whole, while the cluster analysis and phenomenological analysis did not look at each student as a whole; instead, students' experiences were looked at as shared experiences.

The narrative analysis supported the phenomenological findings, as shown in Table 10. The narrative analysis complemented the phenomenological analysis concerning the *own pace*, *own space* and *own face* mediators since it revealed some of the students' personal thoughts from their diary writings and background information, which were not investigated prior to the narrative analysis. The fact that *human* mediator did not appear in the in the diary texts and background information was natural, since these texts concerned the students' studies, personal information, and reflections about themselves as learners. Human mediator, was only commented in the interviews. The narrative profile did not add anything to these comments, although the profile also included some interview comments about the online teacher. Also, the students only commented the IQ test tool in the interviews.

Table 11. Students' narrative profiles confirming the mediators found.

Mediator	Essential mediated experiences (General meaning units)	Confirmed by narrative profile (Name and no. of the student)
Own pace	Could choose when to study	2. Mika, 4. Jouko, 7. Pekka, 8. Paavo, 12. Heli
	Could study when the mood was right	3. Riina, 8. Paavo, 12. Heli
Own space	Being able to concentrate	2. Mika, 12. Heli
	Enjoying informal studying	
Own face	Having privacy for personal expression	4. Jouko, 5. Raimo, 7. Pekka, 8. Paavo
Human	Online teacher as trusted	1. Anna, 6. Marja, 4. Jouko, 7. Pekka
	Online teacher as guide	-----
	Online teacher as monitor	-----
Tool	Tests: knowledge about self as learner	-----
	Tutorial: make student analyze self as learner	1. Anna, 12. Heli
	Diary: make student produce own thoughts	3. Riina, 6. Marja, 11. Antero, 12. Heli

7 THE MEDIATORS SUPPORTING LEARNING

The mediators in this study were found when looking at students' descriptions of their studying in the course through the issue of what supported them.

- *Own pace* mediated the possibility to study when the time or mood was right
- *Own space* mediated being able to concentrate and informal studying
- *Own face* mediated privacy for the expression of personal thoughts
- The *human* mediator mediated the possibility of trust, guidance, and monitoring
- The *tools* mediated self-knowledge, self-analysis, and producing thoughts through writing

The results presented in this chapter are based on the phenomenological analysis, which brought about the mediators. The presentation is supported with results from the triangulation of three methods: clustering, phenomenological analysis, and narrative analysis. The main themes include content from five mediators; for that reason, they are described from multiple angles:

- direct quotations from the interview transcripts;
- references to diaries or background information forms;
- back-up information from the narrative summaries. If the source is not apparent in the text, the source is marked in brackets as “source: narrative”; and
- in some cases, data from cluster analysis is also used. If the source is not apparent in the text, the source is marked in brackets as “source: cluster.”

7.1 Own pace mediated the possibility to study when the time or mood was right

The researcher explored a possible common denominator for the students experiences of “could choose when to study’ and “could study when the mood was right.” This common nominator can be called *own pace*. Different kinds of students liked the possibility of deciding when it was the right time to complete assignments from the tutorial. The possibility of choosing when they studied was essential for less diligent students and students who found it difficult to produce their own writing. The students also state that they were able to manage the pace

of their studies. The mediator *own pace* helped the students in that they could choose when to study and could study when the mood was right.

7.1.1 Could choose when to study

The students enjoyed the fact that they could complete the tutorial assignments from home when they pleased and had the opportunity because IQ Learn was always available online. Antero and Pekka enjoyed being in charge of their own time. Pekka described himself as lazy and driven by his motivation about the study content in the interview and the narrative analysis and said it was good that he could study on his own time. Based on the clustering analysis, students who described themselves as diligent (student nos. 1, 2, 6, 10, and 11) had no problem completing the assignments on time. Some of them who were very dutiful, such as Antero, enjoyed the possibility of choosing when they would study and that they were able to accomplish the study tasks when they wanted and send them via the web (source: narrative)

Pekka: Hmm... Well, in my opinion the good side was that it didn't ... (...) that you could do it on your own time at home... (Student no. 7, male, 7/18)

P: Mmm... no, hyviä puolia oli tietysti omasta puolestani se, et se ei... (...) Et sen niinku... sen pysty tekemään omalla ajalla kotona.

Antero:... In a way, it is nice that you don't have to perform... go there regularly. That you can do it at your own pace... (Student no. 11, male, 6/16).

Antero: ...tavallaan on ihan mukavaa silleen, että ei tarvi olla niin ku se... säännöllisesti käyä aina silleen. Että pystyy suorittamaan omalla ajallaan, että pystyy tälleen lähettämään.

Pre-set schedule supporting the students. Even if the students had the weekly deadline, when the assignment was due, they felt they could decide when to complete the assignments. Jaana preferred having the teacher schedule the work with weekly assignments; otherwise, she would have been in a rush during the last week of the course. Riina liked the schedule and remarked that her personal study schedule was still adjustable. The clustering phase indicated that four students (student nos. 3, 4, 7, and 10) enjoyed the benefit of having a pre-set timeframe for the tasks.

R: Would it have been enough if the online teacher just would have said "return these assignments after a month"?

Jaana: Well maybe it was better like this, that if it would've been after one month, maybe for me it would have meant that I would've left all the 4 tasks to the last week and then I would have been in a terrible rush with them... (Student no.. 13, 12/13)

R: Mmm, oisko se riittäny, että siinä ois vaan alussa ollu verkko-opettaja ja se ois sanonu, että kuukauden päästä palautat nämä 4 tehtävää?

Jaana: No, ehkä parempi tälleesti, että siinä välilläkin tuli sitten niitä kommentteja, että jos se ois ollu kuukauen päästä, niin sitten ois helposti ainakin mulla käyä silleesti, että ois jättäny ne kaikki 4 tehtävää sinne viimeselle viikolle ja sitte ois hirvee kiire ollu niitten kaa tehä ja...

Riina: Hmm... It was good that there was some kind of pre-established timetable that you could even modify yourself. (Student no. 3, 11/13)

Riina: Mmm... olihan se hyvä, et sieltä tuli jonkin näkönen valmis aikataulu, jota sit pysty viä ite muokkaamaan. (...). Sit on pakko tehdä, kun on joku.

Three students did not have an Internet connection at home, but they said they accessed the Internet at school. Only one student stated that she sometimes felt it was difficult that she had to go to school to access IQ Learn. Not being able to access the web-based course from home bothered Marja.

Marja: It can be problematic with the timing, when there was no teaching some days, so when would one...

R: Do you have a computer at home?

M: Yes, there is a computer at home, but no Internet connections. (Student no.. 6, female, 13/16)

Marja: ... se aika voi olla, kun ei kouluakaan välttämättä ollu, niin se oli, et missä välissä.

R: Niin, onks sulla kotona konetta?

M: On, kotona on kone, muttei nettiyhteyksiä. (Student no. 6, female 13/16)

7.1.2 Could study when the mood was right

Being in the right mood to complete the assignments in the tutorial was important for some of the students, such as Pekka, Jaana, and Riina. It affected the quality of their work in that they were not forced to work and finalize their

work at a certain time. Jaana and Riina stressed the possibility of pausing and continuing later.

Studying when interested. Pekka said it depended on his daily attitude whether studying or other activities came first. He needed to be in the mood to study. Pekka liked that he could complete the assignment when he had interest in doing them and when there was nothing else going on. He described himself as social and as someone with lots of things going on.

Pekka: ... It depends on the time of the day, whether or not you have other things going on when you start to work, so it could either be unpleasant or you could really take the time to do it... (Student no. 7, male, 6/18)

Pekka: ... se riippuu ajankohasta millon se rupes tekemään, että oliko siinä jottain muuta häslinkiä vielä päälle, että tuntuko se vastemieliseltä vai oliko sitten ihan ajan kanssa. ...

Could work and pause when one like it. Being in charge of timing added to the quality of some students' work, such as Riina and Jaana, in that they could pause and continue later. Jaana said she had to be in the right mood to write because she is bad at it. She felt she could do the assignments when she was not forced to work at a certain moment but could rather do them when she sensed she could be productive.

Jaana: First it was quite difficult, while I'm very bad in creating any kind of text.

R: Text...?

Jaana: Yes, it was okay then and then that one first had to be in right mood...anyway so that I could have it written. (Student no. 13, female, 6/13)

Jaana: Mmm, no aluks se oli aika vaikeeta, kun mie oon hirmu huono luomaan kaikkee tekstiä.

R: Tekstiä...?

J: Niin, että mut kyllä se sitten ja sit se, että siihen piti sitten tota... olla semmonen tää...ei mieliala... mut kumminkin siis, että sen sai kirjoitettua.

Jaana: Well...it was good that you could do it whenever you felt like it, right when you were most inspired to produce text. (Student no. 13, female, 6/13)

Jaana: Mmm... no se oli hyviä puolia, että sie sait sen tehä just sillon ku siusta tuntuu, että nyt tulis tekstii. Että jos sie koulussa istut tunnilla ja

yrität jottain tehdä ja jos ei ruppee luonnistumaan, niin sitten sille ei voi mittään.

Riina said she had difficulties producing the text, but then she could write the text after a few days of thinking.

Riina: For some of the assignments, it was difficult to find anything to say, but when you thought about it for a few days, it suddenly came together and you managed to finish it. (Student no. 3, female, 9/13)

Riina: Oli siä joku tehtävä, ettei meinannu tekstii oikeen tulla millään, mut pari päivää sitä mietti, niin kyllä se sieltä lopulta tuli valmiiks.

7.2 Own space mediated the possibility of concentrating and informal studying

Own space mediated the students' opportunities to focus and concentrate. The common denominator was the students' experiences being able to study in peace. Successful students in particular appreciated this. The web-based system offered a space that some students utilized to concentrate on their studies. The students also enjoyed non-school-like learning while studying in an informal setting at home.

The *own space* mediator helped the students concentrate and enjoy studying in informal, web-based settings.

7.2.1 Concentration

Five students who, based on the clustering analysis and narrative summaries, were quite successful in their study program particularly appreciated concentration at home (student nos. 2, 4, 5, 7, and 8). These students enjoyed the opportunity to focus. Some students who described themselves as social needed their own time and space to concentrate because other students easily distracted them (student nos. 2, 7, and 8; source: narrative). However, one student said she could focus on working on the computer even in classroom settings.

At home, it was possible to think deeper. Mika said he was quite talented in computing and mathematics. The narrative analysis revealed that Mika was very ambitious although it was not as obvious in the phenomenological analysis based on the interview. He was the only one who said this about himself. He wanted to have excellent grades and he usually strived to do things well. At school, he encountered many interruptions, but at home, he was able to think. Completing the assignments demanded time for reflection first, and he valued the opportunity to think in peace in order to gain clearer answers. During this

course, he appreciated the opportunity to do the assignments on his own schedule and in peace.

Mika: ...if one tried to do this in school there was all kind of interruptions, but at home one was able to think(...). The good sides of the course were that you could do the assignments on your own time. You were able to kind of think a little deeper about some of the stuff before you wrote about it and that way, the answers become clearer. If you had tried to do this at school, there would have been all kinds of interruptions, but at home it was easier to think. (Student no. 2, male, 9/11)

Mika:...koulussa jos yritti tehdä, niin saattaa tulla kaikenmaailman keskeytyksiä, mut kotona sitä pystyy sit miettimään(...). No, hyviä puolia on tietysti, että pystyy tekemään näitä tehtäviä vähän omalla ajalla. Ja pystyy just silleen niinku miettimään ennen kirjottamista, niin vähän syvemmin niitä asioita ja sit tuloo ehkä selkeempiä vastauksiakin.

In addition, Heli said she learns things better and easier when she can study in peace. The clustering analysis indicated that she regards herself as a mediocre student. However, the narrative analysis of her diary indicated that Heli is actually much more industrious and ambitious than revealed during the interview. She said the course offered her a better opportunity to work in peace than school studying and brought her thoughts to the forefront of her mind.

Heli: You probably learn things better when you can do them calmly on your own. (...) ... For me it's easier to work at home in peace. (Student no. 12, female, 11/12)

Heli: Ehkä sitä oppii nämä asiat paremmin, kun saa tehdä omassa rauhassa(...). ...helpompi on miusta tehdä kotona nuo omassa rauhassa tai silleen.

Jaana talked about being on her own, just her and her computer. Studying like this over the Internet made her more focused on her studies. Although other students often said they needed to be at home with the computer to concentrate, Jaana was able to work online at school even if she was surrounded by other people.

Jaana: Maybe you get deeper into things this way, rather through the Internet. (...) when you do it by yourself and you are alone at the computer, even if there are other people around (Student no. 13., female, 6/13).

... ehkä paremmin tulis sitten... tai tullee paneuduttua niihin asioihin tälleen, kun... verkon kautta. (...) että kun sitä ite on sen koneen kanssa tavallaan kahestaan, vaikka oiskin ympärillä muita, niin se niin kun eri tavalla miettii niitä, kun sitten luennolla, että niinku ...

The web-based course seemed to suit Jouko well in that he appreciated being able to concentrate in peace. Based on the narrative profile, Jouko was a talented student in programming with no high school background. In the interview, he gave the impression of being distant and withdrawn, and he chose what he said very carefully.

Jouko: It was easy [to concentrate]. I always did them sometime during the evening, so that I could work in peace. So there would be no concentration issues. (Student no. 4, male, 9/14).

Jouko: Oli, ihan helppo, että mie aina tein ne kotona joskus illalla, et sai niinko ihan rauhassa tehdä. Että ei siin ollu keskittymisessä ongelmia.

No distraction from other classmates. Pekka said he appreciated that there was no distraction from other classmates. Since he was a social person, in school he would have socialized with his friends, his thoughts would have been on other things, and the assignments would have been completed sloppily. Nevertheless, he told that he was not in great need of changing his study style. The narrative analysis of the diary confirmed that Pekka easily learned things he was interested but he was lazy and selective about other things he needed to learn.

Pekka: ...In fact, I always started to do them in the evening, so that there was no one and nothing to disturb me. You can't do them at school. If I had done them at school, it would have just been quick and sloppy. (...) ...so you were in your own world and you could get more into it and work non-stop without being interrupted. (Student no. 7, male, 16/18)

Pekka: ...alotin oikeestaan aina silleen niinku iltasella, ettei silleen niinku ei oo kettään tai ei oo mittään häiriötekijöitä. Että koulussa ei pysty, jos oisin tehny, niin ei ois pystyny, ne ois tullu vaan hutastua. (...) sai niinku ku rupes tekemään, niin siel oli omassa rauhassa ja pysty niinku siihen perehtymään ja pääs tekemään omassa rauhassa suoraan putkeen.

7.2.2 Informal studying

The non-school character of the course was appreciated by Paavo, Heli, Riina, and Jouko. Paavo enjoyed the informality of the studying and that he could work in peace.

Paavo: ...I liked that it was free-form task [the studying], so you could do it on your own and in peace. (Student no. 8., 7/16).

Paavo: No, hyviä just se, että se on vähän semmosta vappaamuotosta, että saapi ite sitten ihan rauhassa tehdä.

Riina had a vocational school background with additional computing courses. She had difficulties with theoretical studies and appreciated the fact that while studying online she could apply theoretical items right away with practical exercises and did not need to work on theory separately. This course offered her this opportunity. She also said she wanted to test a new kind of study form.

Riina: Willingness to try new things. It could be worse [this kind of course in a [classroom] because then it is very school-like again. That you have to sort of sit in the theory classes before you get to do the hands-on part. (Student no. 3, female, 2/13)

Riina: Halu kokeilla kaikkee uutta(...). Se voi olla ehkä vähän huonompi (koulumuotoinen kurssi), et se on kumminkin menee siihen niin koulumaisuuteen sit taas. Et pakko istuu tavallaan siä teoriatunneilla - sit pääsee taas käytäntöön.

Heli had a commercial business college degree (*merkonomi*) and no high school certificate. She took the course because she did not have to attend classes for it and for study credit. She said the course offered her the opportunity to work in peace and brought her thoughts to the forefront of her mind. Heli also said the online teacher was better than a classroom teacher in terms of helping her concentrate better.

Heli: That you don't necessarily need to sit in the classroom, that you can sort of do it there [via the Internet]. (...). Maybe one can get more out of it, when one can work one's own. (Student no. 12, female, 11/12)

Heli: Että voi jollain, että ei niinku tarvi tunnilla istuu välttämättä, että voi niinku tuolla. (...)...ehkä sais niin kun paremmin sitten ne asiat siihen esille, kun sai tehdä omassa rauhassa ne.

In a classroom with computer, the web "kind of disappears." According to Jouko, if this kind of study tool is used in a classroom environment, the web "kind of disappears." He said he took this course "for himself" and for his own benefit.

Jouko: It is sort of like... well, the web kind of disappears there if it [the studying] is only done in the classroom. Then it doesn't matter if it's there or not. (Student no. 4, male 11/12)

Jouko: Siinä vähän semmone... no, se verkko oikeestaan häviääkin siitä, jos sitä täällä luokassa tehdään. Et se on sit ihan sama, et onks se vai ei.

7.3 Own face mediated privacy for the expression of personal thoughts

The ability to work in privacy and not be observed by other students was positive for four students in particular. They could have and keep their *own face* during the course. They had an opportunity to focus on their own personal thoughts. According to the students, this was important because the course concerned their personal capacities and study skills. The students who enjoyed privacy were all quite talented in their studies. However, they were lacking in self-confidence (student nos. 4, 5, 7, and 8; source: narrative) even though they were all quite successful in their studies.

A private place was necessary to write about oneself. Pekka said a private place was good when he wrote about his own thoughts and habits. He mentioned noticing during the course that some social situations, such as talking in public, were still difficult for him. He remarked that the classroom was not a private space where he could write about personal things. Based on the narrative profile, he lacked self-confidence. He wrote in the diary that he knew that he could not manage his studies, because he feared that in the future there would be an invincible barrier that he could not overcome.

Pekka: ...in my case it's not better [with classroom course of this kind of topic], because...one cannot focus on the assignments. When you need to sort of... write about yourself, your habits and such, it is not a private place... When you work in the classroom, there are other things that can disturb you. (Student no. 7, 15/18)

Pekka: ...omalta kohaltani ei ois parempi just sen takia, et se... sitä ei pystyis tota niin keskittymään niihin tehtäviin, kun pitäis niinku... pitää omasta itestä kirjottaa, omista tavoista ja tämmöstä, niin se ei oo kumminkkaan niinku semmonen yksityinen tila oo silloin luokkatilassa kun tekkee, niin siin on ylimääräsiä häiriötekijöitä sitten mukana.

Jouko did not want to look successful in front of other people. In the interview, he said the online environment stimulated him to “find out things” about himself. He also noted that this kind of studies [tangling with the students’ personal study skills] cannot be “pushed” on students; instead, it is better for students to discover it on their own. He wrote in the diary that he did not want to be something special or above other people. The diary revealed that he could receive very high grades in some subjects (mathematics and ICT), but he did not want to be seen as better than other people. Instead, as he wrote, he liked to determine the mood of the teacher or other students before he “[made] his move.”

Jouko: ...Self-confidence and human relations need improving. . [9/12]. (...) In any case, I think it might be better that they don't impose this kind of knowledge on you. That you discover it by oneself. It is almost more efficient. (Student no. 4, male, 11/12)

Jouko: ..vähän itseluottamus ja ihmissuhteet ja niissä olis parantamisen varaa. . [9/12] (...)On must kummiskin ehkä parempi, että sitä ei niinku tyrkytetä sitä tietoo noissa asioissa, et se niinku ite ottaa sen selville. Se on melkein tehokkaampaa.

In a regular classroom course, one cannot think about this kind of feeling. Raimo mentioned in the interview that one cannot think about these kinds of feelings in a classroom. The course made Raimo reflect on things such as how he is as a student. He enjoyed this reflection, which he expressed in many different connections during the interview. He described himself as average and not particularly good in anything. However, narrative analysis revealed that he was quite talented and ambitious in his studies. He wrote in the diary that he wanted to be comfortable and not work hard. He wrote that he monitored his grades and progress, set goals, and tried to reach them with as little effort as possible. Furthermore, he wrote that he lacked self-confidence and that if he believed more in himself and his success, he would do the exercises more confidently and aim for higher study results.

Raimo: When I did this at home in my own world... Well, it was easier to fully concentrate on it. [11/14] (...) ..in a regular classroom course, you can't think about this kind of personal stuff and feelings in peace. (...) [14/14] (Student no. 5, male)

Raimo: Kun mie tein tuota tosiaan kotona kaikessa rauhassa, omassa rauhassa, niin... niin tuota siinä pysty hyvin keskittymään sitten. (...) ...koulukursseilla niin ei tuu omia juttuja, tuntemuksia ja noita sillä tavalla mietittyä. (...)

Paavo said during the interview that those who dared speak their own opinions aloud would take this kind of course in a regular classroom. He said he learns better during classroom teaching but in this kind of course, which was based on reflection, it was maybe not needed. He also remarked that in a classroom, one could not or did not want to bring up personal things; in that case, those who dared speak their own ideas aloud would take the course. The narrative profile indicated that Paavo had a vocational qualification in business and administration but no high school education. It also revealed Paavo's lack of self-confidence. He indicated on the background information form that he was a little restless as a learner, too impatient, and did not trust himself enough. He was ambitious in programming, and he wanted good grades in subjects that were

important to him. However, he worried too much about what the others thought about him. His self-confidence was weak. The diary deepened the picture of him as a social person who tried to please others. He said that making a good impression was very important to him.

Paavo: Then again, in a classroom you can't do it in a personal way... can't sort of personally express in that way... (...). The kind of people go for that kind of [classroom courses] who dare those, who dare to speak about their own... (Student no. 8, male, 13/14)

Paavo: Sitten taas luokassa ei sillä tavalla henk... pysty niinku henkilökohtaisesti jokinainen sitten tuomaan varmaan sillä tavalla, uskallakaan tuoda esille, eikä haluakaan, että... (...). Semmoset varmaan siihen hakkeutuu kurssille sitten semmoset, ketkä uskaltaa sitten ääneen omia...

7.4 The *human* mediated the possibility to trust, guide, and monitor

The experience of having a person connected to the course, though not a teacher in the traditional sense, was important. The students experienced the online teacher as the following:

- a source of trust;
- a guide; and
- a monitor.

7.4.1 Online teacher as trusted

Trusting the teacher with their thoughts was important to some students, even if they did not have problems with their studies (student nos. 14, 7, and 4). Trusting the teacher involved confiding personal thoughts. Two students needed to trust the teacher because they lacked self-confidence (student nos. 7 and 4). Students who had problems completing their studies needed to trust the teacher as someone who understood them (student nos. 1 and 6).

The experience of trust was created between the student and the teacher for various reasons. Some students needed to know who the teacher was or what kind of person she was. They emphasized the importance of meeting the teacher in the two face-to-face information events prior to the course beginning. They also enjoyed the anonymity of the teacher because they could confide their thoughts to someone who was not their regular teacher. They experienced trust with the teacher because the communication involved only the teacher and not the entire classroom. This experience encouraged the students to think in an in-

depth manner about themselves as well as express and share their thoughts with the online teacher.

One needs to know who the teacher is. The students experienced the online teacher as an important figure and as the “face” of the course. The teacher was important to Kalle, Jouko, Antero, and Marja. Kalle said he needed to know which teacher he could connect the course to.

Kalle: ... I don't know if I'm... Maybe I'm thinking in an old-fashioned way, but in my opinion there always has to be a person who you can connect with in the course. (Student no. 14, male, 10/11)

Kalle: ... en tiedä oikeen onko sitä... ajatteleeko sitä vanhanaikaisesti, mutta mun mielestä aina pitää olla joku henkilö silleen, että jonka kanssa pystyy sen niinku esmes kurssin yhdistämään ja...

In addition, Jouko said he needed to know whom he was talking to. Regardless of the fact that most students enjoyed the privacy allowed by the web-based course environment, some students felt they “talked” to the online teacher. However, no real-time communication channels were utilized; the only communication used during the course was email.

Jouko: ... I think it would be better if you could see the teacher... at least once or twice. You would know who you are talking to even if sometimes it seems like there is no teacher, that you are on your own. But anyway, it would be better to know a little more about it. (Student no. 4, male, 10/12)

Jouko: ...on se must parempi, et sen opettajan niinku näkiskin...ainakii sen yhen kerran tai kaks kertaa. Tietää niinku vähän kelle kummiskii puhuu, vaikka se välillä tuntuukin, ettei siin oo opettajaa - sitä tekee itselleen. Mut kummiskii se on ihan hyvä, että tietää vähän.

Antero said it was a bit strange to send his assignments to an unknown person and not his regular teacher. The narrative analysis showed that Antero did not want to reveal too much about himself. He also remarked that it was good to know who read his assignments and that it would otherwise be superficial to work only online.

Antero: ...It felt kind of strange to send my personal things to someone I didn't know... (...) A: Anyway, they were not that personal in the end. Your own study methods, so... [5/16] (...)...It's good that you know from the beginning who will be reading the things, who is watching and why. Otherwise, it would remain kind of superficial on the web, particularly when you have to write this kind of personal stuff... [13/16]. (Student no. 11, male)

Antero: ... se tuntu silleen, että vähän niin kun tuntemattomalle lähettää jotain omia asioitaan.(...)Niin, mutta ei ne kuitenkaan mittään niinku semmosta hirmu henkilökohtasta loppujenlopuks oo. Että omii opiskelumenelmiä, että [5/16] (...) on ihan hyvä, että aluks tietää, että kuka siellä niitä lukkee, kahtoo ja mikä se on tarkoitus. [13/16].

If one dared ask, would she understand? Marja said in the interview that her grades were below average and that she was more of a handy person who liked practical things. During the interview, the researcher got an impression of a timid student. Marja said she would need to see the teacher at least once in the beginning of the course to know who she was working with and what kind of person she was to ask for advice. She also said when she could not see the teacher while studying online, she did not know if the teacher understood her. The test results for her areas of strengths were most important for her because she got reinforcement about being a handy person and that practical skills were her strongest area.

Marja: I don't know if you can say it's bad that you sort of don't see the teacher. (...) Then you wonder, if you can ask her whatever comes up and whether she would understand it ...? [6/14]. (...)...if you could see the teacher at least once, so you would know who you are doing things for... then you would know who the teacher is. [14/16] (Student no. 6, female)

A little easier to write when it was not that kind of teacher. The trust issue was also present in statements when the students said they needed to know to whom they were sending the diary assignments. The course also gave them the opportunity to share things that would not have been shared with regular teachers they saw daily. Anna said the fact that the online teacher was not a regular teacher from school was good because she could reflect in peace this kind issues of personal study skills, and that she would not have been able to reflect in that way with a regular teacher. It was easier for her to write to a teacher she did not see every day. She said she would not share the things she wrote with her regular teachers.

Anna: ...It was maybe a little easier to write than if there had been a teacher who is...who you know really well and who is always there, so ...[6/16](...) There are some teachers you wouldn't like to do this with. [7/16]. (Student no. 1, female)

Anna: ...oli ehkä vähän helpompi kirjottaa niinku, ku sitte et ois ollu sellanen opettaja, joka on...jonka tuntee tosi hyvin ja on koko ajan paikalla, että...(...) Täl kursilla oli hyvää just se, että tota...niinku ku täs pohdittiin näit juttuja, niin mun mielest se on ihan hyvä, et on vähä sellanen...tai kirjoitti niinku jollekin semmoselle ihmiselle, joka nyt ei ollu ihan joka päivä siinä. (...) Joo, on joitakin opettajia, että ei niinku haluis tommosta.

Pekka said it was good that not everyone could see his writing.

Pekka: When it went only to the teacher and wasn't visible to everyone, so it was quite OK, so I didn't have anything against that. (Student no. 7, male, 7/18)

Pekka: ...kun se jäi pelkästään, että meni vaan opettajalle. Että ei silleen, että ei ollu kaikkien muitten nähillä tai näkyvillä, niin se oli silleen ihan OK, et ei siinä ollu mittään siitä vasttaan.

7.4.2 Online teacher as a guide

The online teacher was clearly experienced as a guide and not a traditional teacher. She was an asset if problems arose with the course, although no one asked for help during the course. However, they knew that help was available via email. Only one student said no one was available to help. The students completed the assignments in the tutorial on their own according to the guidelines in IQ Learn. The online teacher gave the assignments each week via email, and the students were supposed to find an assignment independently from the IQ Learn tutorial. Some students complained that it was difficult to find an assignment for them in the IQ Learn tutorial. During each week of the course, they could choose what assignment they did within the theme given by the online teacher. However, the students felt it was good to have the online teacher available to provide help if they needed to ask about the assignments, but everyone completed their assignments by themselves.

Most students indicated that they could ask the teacher for advice via email. However, two students expressed that it was difficult because the teacher was not present to ask for advice face-to-face.

Pekka: ...a guide slash teacher. Of course there good side of it is that if there is an online teacher, she is in a way always there - sort of. (Student no. 7, male, 8/18)

Pekka:...se on lähinnä tukihenkilö kautta opettaja. Tietysti se hyvä puoli siinä on, jos on verkko-opettaja, niin se tavallaan niinku aina paikalla – tavallaan.

According to Antero and Jaana, the role of an online teacher is to guide; they said they could ask for help if necessary.

Antero: Well, it's more like a guide or someone like that who is saying what needs to be done and you can ask questions if you need it, if you don't understand something or don't know how to do it. (Student no. 11, male, 7/15)

Antero: Kyllä se nyt siihen ohjaukseen ja muuhun mänee, että kertoo, että mitä tehdään ja tarvittaessa voi sitten kyssyy, jos ei ihan kaikkee ymmärrä eikä ossaa tehdä.

Jaana:...Maybe a guide or a controller or someone like that, but not a teacher, since she isn't teaching anything. That the material is then available and you take what can get from it and ...(Student no. 13, female, 8/13)

Jaana: Niin, se on ehkä joku ohjaaja tai valvoja tai silleen, että ei nyt opettaja niinkään, koska eihän se nyt tavallaan opeta ite mittään. Että se aineisto on sit siellä ja siitä ite ottaa irti minkä saapi ja...

Paavo said if there would have been a more exact description about the assignments, he could have possibly studied without an online teacher.

R: Well, could you have completed this course entirely...without any online or this kind of person who gives assignments?

Paavo: Well, that could have been possible, if there would have been a more exact description about assignments, the same kind of introduction event package which you gave., [But] In writing, so maybe it could be done, at least with this course. But having online teacher is surely better [than no teacher], that one can ask questions and give feedback, to explain how the tasks are completed and other such things... (Student no. 8, male 8/16).

R: Niin oisit sä voinu suorittaa tän kurssin ihan... ihan ilman et siin ois ollu mitään verkko-opettajaa tai tämmöstä tehtävän antajaa?

Paavo: Kyllä siinä ehkä ois semmonen mahdollisuus, jos siihen tulis tosiaankin joku semmonen tarkempi kuvvaus siitä tehtävästä ja vähän samaan tyyllisen pohjustuksen tekis, ku sie oot pitäny. Ihan silleen kirjallisesti, niin ehkä se sillon onnistus kyllä kuitenkin ainakin tän kurssin osalta. Kyllä se verkko-opettaja siinä varmasti on parempi, että siinä pystyy vähän kyselemmään ja antaa palautetta, että miten ne on tehny ja muuta että...

Raimo said without a guide, he would have difficulties being motivated.

Raimo: Well, you could do it [without the web teacher], but it's difficult then to... if there's no guidance so... You need to really be motivated to bother to do those... (Student no. 5, male, 13/15)

Raimo: No, kyllähän sen vois tehdä, mutta aika hankalaahan siihen on sitten... jos siihen ei mittään ohjattua hommaa oo niin... pitää olla kyllä sitten tosiaan itellä motivaatio aika kohillaan siihen, että viitsii tehdä niitä...

The traditional teacher-student relationship was missing. Kaija missed the normal teacher-student relation. She also said she thought all the students were nerds in this study program.

Kaija: ...In a way, you are sort of guided, the way it was going forward and what we were doing, making sure the meaning was right. It is independent work, but contact is lacking in a way, the usual contact in a teacher-student relationship, I mean a face-to-face teacher.

R: Isn't that a bit of a disadvantage?

K: In a way yes and in a way no. Because school isn't like this all the time. It would be, if you attended school via the web. In that case, I would say that something would be missing in order to experience being a student. (Student no. 9, female, 14/25)

Kaija: Tavallaan siehän ohjasit sen, et miten se etenee ja mitä tehhään, että onhan siinä se merkitys justtiinsa. Että se on itsenäistä työskentelyä, et puuttuu se kontakti tavallaan tietyllä tavalla, mikä tullee niinku normaalisti... niinku opettaja-oppilas suhteessa, siis kun on läsnä oleva opettaja.

R: Eiks se oo vähän negatiivinenkin asia, vai onko?

K: Toissaalta on, toissaalta ei. Kun eihän se oo koko ajan tämmöstä koko koulu oo. Sitten se ois, jos koko koulu ois aina tuommosta verkon kautta. Tai mie sanon vaan, että jotain puuttuis, että tuntis että on opiskelija.

In addition, Mika missed the "real" teacher.

Mika: The bad side is the lack of a teacher, if you had a problem, you couldn't ask any questions right away. (Student no. 2, male, 4/11)

Mika: Huonompia puolia opettajan puute, jos tulee joku ongelma, ei heti välttämättä pysty kysymään.

7.4.3 Online teacher as monitor

Had to do good enough work while there was control. Some students (student nos. 4, 7, and 10) said it affected their study motivation that someone controlled whether they did the tasks, and some said they had to do them “well enough.” In some cases, the lack of an online teacher was a hindrance for them to manage the course. The fact that all the students would rather study with an online teacher indicates how important a human supporter is in the context of web-based studies.

R: What was the point of having an online teacher to oversee the studies...?

Jussi: I can't say, but there were clear deadlines on when to return the assignment and then also a confirmation that you have received the assignment. (Student no. 10. male, 9/11)

Jussi: No, en ossaa silleen arvioija, että miun mielestä oli niin selkeet ne päivämäärät mihin pallautetaan ja sitku sulta tuli pallaute aina, että on tullu perille, niin...

Someone has to demand the student to work. Pekka said someone has to demand him and set criteria for his work. He also said the feedback was a motivator. Having the right motivation was necessary, according to Raimo. If there were no guidance, it would be difficult to complete the tasks.

Pekka: In my case, I sort of had to...well, in my case the teacher has to...the online teacher, she has to tell me to do it. If she isn't telling me what the requirements are... I wouldn't do any of it. Now, there were deadlines and criteria on how much you had to write. That sort of helped... (Student no. 7, male, 14/18)

Pekka:... niin kun minun kohalla ainakin pittää olla tai sen opettajan pittää... on se sitten verkko-opettaja, niin sen pittää vaatii minua, että minä pystyn tekeen. Muuten jos se ei aseta vaatimuksia, niin sitten mulle... mää en teekkään sitten mittään. Tavallaan että nyt oli niin ku määräpäivät kautta tais ollakin viä sana... tai miten se oli kriteerit, että pittää olla sen verran kirjoitettuna. Niin se niinku autto siinä...

In the background information, Jouko wrote that he needed clear deadlines; otherwise, he would leave things to the last moment. Paavo stated that he could easily slip up or forget the assignments. The online teachers monitoring was needed. In the background questionnaire, he wrote that he was a little restless and too impatient as a learner. He wanted to learn as much as possible with as little effort as possible.

It wasn't because of the course but the student's responsibility... You might slip up when no one is there to check up on you...you are sort of in charge that the assignments are done in due time. You can easily forget when there is no contact, someone who's in active contact. [7/16]. (...) ...well it's good that there is someone who watches over. Of course, it wouldn't work with the net only. [8/16]. (Student no. 8, male, 7/16).

Sitten taas huonona, ehkä se saattaa just...se ei oo sen kurssin huonoutta, mutta tekijän huonoutta...saattaa siihen lipsua siitä, että siin ei kukkaan sillä tavalla oo... siin on niinku ite vastuussa niistä tehtävistä, että ne tulee ajallaan tehtyä. Sillon saattaa helposti kun siinä ei oo semmosta kontaktia, niin ei sillä tavalla oo aktiivisesti yhteyessä, niin siinä saattaa niinku helposti unohtuakin niitä asioita sitten tehdä. (...). et onhan se hyvä, et siinä joku seuraa. Että tietenkin, että se ei tota... ihan sen verkon kans pelkästään.

7.5 Tools mediated self-knowledge, self-analysis, and thinking through writing

The IQ Learn tests were formed with the course content in sight and helped the students learn self-regulative strategies and skills. By providing knowledge about the student as a learner, they directed the students' attention to themselves as learners, showed the aim of the course, and initiated the students' thinking processes.

The students who liked completing the *tests* were all quite talented in the main subjects in their programs. They also described themselves as being lazy sometimes. The *assignments in the tutorial made the students analyze themselves as learners*. Four of the five students who particularly enjoyed analyzing themselves as students described themselves as outgoing and social.

The *diary* concretized the process of thinking and analyzing for some learners. They said they had to think before writing and elaborating on how they could develop as learners. Students had to produce their thoughts in the diary, i.e., show in writing that they had done the assignments and analyzed themselves as learners. The students who benefitted most from this were the ones who were diligent and timid. They were unsure about themselves as students and had difficulties with theoretical subjects.

It is not surprising that the tools supported the students while they learned about themselves as learners and developed learning skills. The IQ Learn tests, tutorial, and diary acted as mediators as shown in Figure 10. in chapter 6.7.4.

The students used the words "self-reflection" or "thinking about themselves" when describing their work with the IQ Learn tools. They brought up different aspects of thinking when working with the various tools.

7.5.1 Tests provide knowledge about self as learner

The initiating role of the tests appeared in many interviews. Doing the tests and seeing the tests results made the students think about themselves as learners and select tutorial assignments according to their personal test results. The students who said they liked the tests the most were students who did not have many problems with study skills (student nos. 4, 7, 11, and 14). They did not learn very much new information about themselves, but the tests brought the aspects they knew “up to the surface again.” Some students also obtained new information about themselves. One student noted, the tests “made one to notice.” The learners did not comment on the tests as much as the other IQ Learn tools; most students mentioned the tests in connection to the tutorial assignments or diary.

Confirming how I am as a learner. Jouni said the IQ Learn tests often gave a correct picture of him. He said he knew what the test results would be but discovered that he thinks quite negatively about himself and underestimates himself.

Jouko: Yes the tests...especially if one looked at the test results, one began to see such things...many times they were also quite correct. There was this kind of things which gave the right result at least in my case...

R: Were they things, which made you to think if you are like that...or did you thought that you already knew this?

J: Well quite far it was so that I already knew those. But maybe there was as much that I think quite negatively anyhow. Sort of look down, if I compare..... (Student no.. 4, male, 4/11)

Jouko: Joo, kyl ne testit... etenkin testituloksia ku katto, niin kyllä sieltä niinku hahmottu ihan semmosii... hyvin monesti ihan täsmäskin oikein. Sieltä joitain kohtii löyty ihan, mitkä anto ihan oikeen tuloksen ainakin omalla kohdalla.4.

R: Oliko ne semmosia, jotka pisti vähän miettii, että oletko sä tollanen... vai ajatteliks sä, et tän sä tiesitkin jo?

J: No, aika pitkälti oli silleen, et kyllä mie ne tiesin. Mut ehkä sieltä sen verran löyty, et mie kummiskin aika negatiivisesti ajattelen. Vähän niinku alakanttiin verrattuna...

Pekka said he was faced with an aspect of himself that he thought he had grown out of.

Pekka: I had forgotten about that, about performing or talking in public or sort of... (...). When I used to be a group leader, I felt like I could handle it.

But then after these tests, when the results show up, you realize it's not like you thought... (Student no. 7, male, 12/18)

Pekka: ... oli unohduksissa semmonen, kun niinku tällöinen julkinen esiintyminen tai esitystaito tai joku vastaava...(...) kun ryhmänjohtajana olin, sen jälkeen tuntu, että nyt sekin homma on hanskassa. Mut sitten niitten testien jälkeä niin se tuloksetkin osotti, että se ookaan silleen niinku, kun oikeesti miettii...

Antero doubted whether the tests and assignments gave an accurate picture.

Antero: ...The assignments and tests were done... you wonder if there is anything... if it gives you an accurate idea. (Student no. 11, male, 4/16)

Antero: ... siinä tehtiin vaan ne tehtävät ja testit muut... onkokaan siitä mitään... saakokaan siitä mitään luotettavaa kuvaa.

Pushing to learn more about myself. The IQ Learn tests were a kind of “motivator” to further study with IQ Learn and select assignments in the IQ tutorial. The link from the tests to the assignments in the tutorial was also experienced as being very close. According to Kimmo, the tests were the IQ Learn tool that made him notice things about himself.

Kai: Hmm... Well, the tests [best tool] allow you to discover things. [7/11](...). Well, maybe the tests were the most useful part.

... The tests make you get more into it... [11/11] (Student no. 14, male)

Kai: Hmm...ehkä se testit on hyödyllisin niistä. (...)ehkä siihen joutu niin kun panneutumaan eniten niihin testeihin, että silleen...

Jaana said the IQ Learn tests revealed “raw truths” about her that she then elaborated on in the chosen assignment. She was aware that she was not as ambitious as she could be; she said she was lazy, and the tests showed that she did not put much effort into her schoolwork and that other things took priority in her life. In her comments, the close link between the tests and the assignments is clearly visible.

Jaana: And then when you of course were thinking about the assignments, about what to write and how to write it, you got to think about all different kind of things, so...

R: Can you mention any particular eye openers?

J: Well yes, maybe the time management and that kind of thing.

I noticed that I don't put in much effort...that is, I do the school work only if I have the time. (...). J: I'm not thinking that school work comes before other things. (Student no. 13, female, 4/13).

Jaana: (...) kun niitä tehtäviä mietti, että mistä kirjottaa ja miten, niin tulihan siinä mietitty vähän kaikkee erilaisii juttuja, että...

R: Oliko näistä joku semmonen joka erityisesti tavallaan avas silmiä... että joku alue, joka jäi mieleen?

J: Niin no, ehkä se just, kun siinä oli ajankäytöstä ja tämmösestä näin. Että se just huomasi, että niinku panosta hirveesti... et se on niinku, että jos kerkiin, niin teen sitten jottain kouluhommia.

7.5.2 Tutorial make students analyze self as learner

The IQ Learn tutorial assignments made the students analyze themselves as learners. After doing the tests, IQ Learn suggested links to the IQ Learn tutorials, which included suitable advice and assignments. For example, if a student had low scores in seeking help, he or she received links on how to seek advice.

Learning to think more critically. The course assignments in the IQ Learn tutorial encouraged Anna to think more independently and become a more critical learner. The text in her diary assignment revealed that during high school, she had to work hard to get average grades. She also wrote that when she began school in the fall she had some difficulties but that her studies were proceeding well at that time. Anna wrote of her ability to think by herself and think critically while using the tutorial. She said her overall learning skills had improved.

Anna: Assignments made me analyse or reflect on myself after the tests. [15/16]. (...)...When you had to think about those things, many other things came up. (...). For example, this critical thinking, so, well, when I did that assignment these kind of things popped into my mind. You noticed that, un-huh, I'm like this and that... Some of my personal features, like how I thought about things and such ...[3/16]. (Student no. 1, female)

Anna: Piti analysoida sen testin jälkeen.... (...)...ku sitä niis tehtävissä piti pohtia, niin siitä sitten aukeni monta asiaa.

R: Joo, voitko sanoa jotain esimerkkejä?

Anna: Esimerkiks tätä kriittistä ajattelua, niin tota sitä ku tein sitä tehtävää, niin siitä esimerkiks aukes tälläsiä, että huomasi, et aha, mä oonki tämmönen ja tällänen...jotain ominaisuuksia mitä oli että...miten on ajateltu asioista ja tälleen, että...(3/16). (Student no. 1., female)

Heli wrote in the diary about her feelings of insecurity as a student and that she was not thinking critically while studying. She wrote in the background information that she wanted to become more self-confident in her work and while studying. In the interview, she said she thought that studying was meaningful on its own, not only for grades, and that critical thinking was new for her. Heli's diary assignments showed that she was actually much more industrious and ambitious than she indicated in the interview.

Heli: Yes, that like... there was this kind of question about... what was it about? Something that sort of... if you prefer to look for the kind of information that is not useful for the tests or something... (...) That grasping things or whatever, well, in my view, it is really rewarding, even though the exam may not go so well. (Student no. 12, female, 8/12)

Heli: Just se että niinku...mikä siellä oli semmonen kysymys, että tota...mikähän siellä oli? Jotain semmosta, että niinku...ettiikö mieluummin semmosta tietoo, mistä ei oo välttämättä siihen kokkeeseen hyötty tai jottain, niin...(...) Silleen, et se oivaltaminen tai joku vastaava, niin kyllä muista se on hirmu palkitsevaa, vaikka se nyt ei meniskään niinku se koe välttämättä hyvin.

R: Well ... was there a particular area, which made you to think particularly...or a bit unsure, so that in this I'm bad or something like that?

Heli: At least there was the critical thinking I think or...with that I have quite...it was a quite new thing, hadn't been thinking about that, but...

R: Mmm...so that...that felt like a thing, that ...you haven't been practicing in studies...

Heli: Yes. (Student no. 12, female, 9/12)

R: Joo, no tota ...oliks siellä jotain aluetta, mikä sai sut tunteen erityisen...tai hieman epävarmaks, että tässä...tässä sä oot vähän huono tai jotain sellasta?

Heli: Ainakin siellä oli joku kriittinen ajattelu tais olla tai joku vastaava ...se on kans mulla aika...se nyt oli aika uutta asiaa, että ei oo sitä tullu mietitty, mutta...

R: Mmm...et siihen...se tuntu semmoselta, et se...sitä sä et oo hirveesti harrastanu opiskelun...?

Heli: Niin.

Analyzing with the assignments in the tutorial. Jouko said that with the assignments he needed to study seriously and to really deepen into the tasks. Jaana and Kirsi also said they needed to stop thinking about the assignments.

Jouko: ...When you get the assignments and you start to do them, you should really have to take them seriously. If you don't have to work hard on them, it is easy to get off track. So... If the assignments are done well, allowing you to get way into the topic, it works really well. (Student no. 4, male, 5/12)

Jouko: ... ku annetaan tehtäviä, niin siis täytyy olla silleen, että tehtäviä ku käy tekemään, niin joutuu tosissaan lukemaan sitä. Et jos siihen ei tarvii niin perehtyy, niin se niinku tahtoo helpost mennä vähän, et rupee luistamaan niistä. Että... jos tehtävät on suunniteltu hyvin, et siinä joutuu perehtymään asiaan, niin se on must ihan toimiva ratkasu.

Kaija: ...Well, I would say that, well...that it is the assignments. I always thought it's good to have them. That you stop and think, "So, where are we heading?" In my mind, this was a good system. (Student no. 9, 12/25).

Kaija: ...kyl mie sanon, että tota... siis tässä nää tehtävät just, niin kyl mie oon aina sitä mieltä ollu, että tämmösiä niinku kannattaa olla. Et jossa pysähtyy niinku miettimään, et "haloo, et missä mennään". Et miusta oli ihan mukava tälleen tää kokonaisuus.

7.5.3 Diary make student to produce own thoughts

The diary helped the students think, express, and produce their own thoughts through writing. Talented students who lacked self-confidence (student nos. 5, 7, and 8; source: narrative) and students who were lacking in theoretical thinking (student nos. 3 and 6; source: narrative) valued writing in the diary. For many students, particularly Riina, Marja, Jaana, and Pekka, writing in the IQ Learn diary was difficult at first.

Thinking before writing. Four students said the diary made them reflect and that sometimes they would pause writing and continue later. Raimo expressed his thoughts regarding himself as a student in the diary. While he said he was not a particularly good student, in his diary he also wrote that he wanted to reach a certain ambition level. He felt he was reflecting deeper by using the diary. As already described, he felt he could not think these kinds of things in a classroom. He also stated that if he believed more in himself and his success, he could do the exercises more confidently and obtain better study results.

Raimo: In my opinion, in the [diary] one, you got to reflect on this really deeply... (15/15). (Student no. 5, male).

Raimo: Miun mielestä se, et siitä [päiväkirja] tuli kaikkein syvällisimmin pohdiskeltua tätä asiaa...

Pekka said the diary put his thoughts to flow.

R: Was there a particular section, a test or an assignment which would have brought your... awaken some thoughts?

Pekka: I don't remember, if there was particular. But, yes, now I remember that each assignment in a way ...when you then were writing the diary, you really had to think and this let your thoughts flow. (Student no. 7, male)

R: Joo, olisiko siinä joku erityinen osio, joku testi tai tehtävä, joka olis tuonut sulla... herättäneen ajatuksia?

Pekka: En nyt muista, että oisko joku erityinen, mutta siis kyllä nyt muistan sen, että jokainen tehtävä tavallaan... kun sitten kirjotti päiväkirjaan, niin siinä piti sitten miettiä se niinku silleen ajatuksia laitto myllertämään.

Paavo said the writing did not happen by itself and that he needed to think.

Paavo: Things don't come out just like that. You have to think it over before writing. You really have to think about it, so... (Student no. 8, male, 7/16)

Paavo: Kyllä siinä, että ei se ihan itestään tuu se. Pittäähän niitä miettiä ennenku kirjottaa. Kyllä siinä joutuu pohtimaan niitä, että...

Mika simply said the diary clarified his thoughts.

Mika: Well the diary was quite good and... or at least it also clarified one's thoughts. (Student no. 2, male, 3/11)

Mika: No päiväkirja oli ihan hyvä ja... tai ainakin se selventi sitten ajatuksia kanssa.

Producing through writing. Jaana said writing is difficult. However, she thought and wrote, which can be interpreted as a learning process in her case. She said writing was her weak point. Sometimes she could not write; on other days, when she had been thinking about things in her subconscious, it went well.

Jaana: I always tried to write and nothing came out of it, but the next time much better.)(...) well it can be that one reflects in the sub-consciousness somehow, so...

R: ...so what to say or what one should say...

Jaana: Yes exactly, and then another day it just comes better the text and so. So it's not just like "whoops". (Student no. 13, 4-5/13)

Jaana: Miekii niin kokkeilin aina kirjottaa ja ei tullu ei yhtään mitään, ja sit seuraavana tulikin sit paljo paremmin. (...) Niin, se voi olla, että sitä ajattellee sitä alitajunnassa jollain tavalla, että...

R: ...et miten se sanoo tai mitä sanos.

Jaana: Niin, justiinsa ja sitten tota toisena päivänä vaan tullee paremmin tekstii ja silleen. Että se ei oo semmosta töks.

Riina said she was not fond of theoretical "stuff." In her interview, Riina said she found theoretical subjects difficult. The diary revealed that she was persistent and worked hard even if she only got low grades in some subjects, such as languages, and got average grades at best in other subjects. Further, she wrote that she should question the things teachers say more, find out things from books and the Internet, and not just remember what teachers say. The background information provided by Riina at the beginning of school showed that she believed in herself more when she entered NKTUAS in the fall than at the end of the course. She wrote in her diary assignments that theoretical subjects were very difficult for her and that she received medium grades with hard work. On the background information form, she wrote that she had no high school experience but had completed commercial business school (*Kauppaoppilaitos*). The course made Riina think when she wrote the assignments in the diary. She first thought she could not get the writing done, but after two days of reflection, once she got started she was ready to write. Riina said during the course, her self-knowledge improved and she learned to trust her own skills. She said she came to appreciate theory during this course. The course made her think she could possibly study differently and that theory, not just practice, was meaningful. In addition, her test preparation skills improved.

Riina: For one of the assignments, it was difficult to find anything to say, but when you thought about it for a few days, it suddenly came together and you managed to finish it. (Student no. 3, female, 9/13)

Riina: Oli siä joku tehtävä, ettei meinannu tekstii oikeen tulla millään, mut pari päivää sitä mietti, niin kyllä se sieltä lopulta tuli valmiiks.

Marja described herself as shy, quiet, diligent, and prompt. She said her grades were below average and that she was more of a hands-on person who liked practical things. She lowered her ambition level in order to pass courses and not become too nervous, because then she could fail. Her diary text revealed how hard it was for her to obtain good grades in courses.

Marja: Mmm...sometimes I'm quite shy and quiet. But when needed, I can always speak up. I'm sort of this kind. (...)

Marja: Well, at least I'm trying, I'm diligent and prompt. (...)[3-4/16].

R: How did it feel, that to be writing freely?

Marja: Sometimes it was difficult but once you got it going, it worked. [5/16]. (Student no. 6, female)

Marja: Mmm...välillä aika ujo, hiljanen. Mut sitten jos tarvii niin kun jotain sanoo, niin kyl mä sit sanon aina. Että oon vähän tämmönen. (...). M: No, kyllä mä ainakin yritän, että mä oon tunnollinen ja täsmällinen, mut välillä saattaa, että ei ihan oikeen. (...)[3-4/16].

R: No, miltäs semmonen tuntu, se oma vapaa kirjottaminen?

Marja: Välillä vähän vaikeelta. Mut sitku alkuun pääsi, niin sitten tuli kyllä.

8 DISCUSSION

8.1 Feuerstein's and Vygotsky's theories in digital learning environments

This study evolved from an interest in the concept of mediation, particularly within digital learning environments. Since they were created before the digital era, Feuerstein's (1990; 1991) and Vygotsky's (1978) theories could not predict these new learning settings. Reflection on these theories raised the question of whether they fit the studying and learning that takes place in digitally mediated environments.

Vygotsky's (1978) theory offered a conceptual understanding of how mediation transforms human learning. Vygotsky's contribution was his view of the transformative role of learning, in which symbol systems and human mental processes develop constantly. Vygotsky (1978) states that when the artifacts of learning change, learning also changes. Hence, mediation and mediators are vital parts of the transformative process of learning.

Feuerstein's (1990; 1991) theory directed attention to the role of mediators in human learning experiences. The core of his theory of Mediated Learning Experience (MLE) theory is that the quality of mediation is vital for successful learning and that certain mediated learning experiences are needed in the learning process. According to his theory, the quality of the mediation is analyzed through experiences.

8.1.1 The integrated definition of mediation presented in this study

Based on Vygotsky's (1978) and Feuerstein's (1990; 1991) theories, this study presented and integrated the definition of mediators, which focused on the task, quality and type of mediators as promoters of learning. This integrated definition is reviewed here based on the research findings. The integrated definition (see Section 3.3) suggests that the mediators' task is to act as learning promoters, that learning requires high-quality mediators, and that human and tool mediators are mediator types. This study aimed to reveal the mediators that higher education students found important when they learned self-regulative skills and strategies. The main results and the integrated definition of mediators are discussed in the following summary. In addition, the meaning of mediation quality in the context of web-based learning of self-regulation is considered.

The tasks of mediators as learning promoters were confirmed in this study. This study found that mediators played an important role in students' learning experiences. The *own pace* and *own space* mediators extended the students' choices regarding when and where to study, which was seen as very important. The students also valued the *human* and *tool* mediators. The human mediator provided personalized support in the form of an online tutor, and the IQ Form digital learning environment offered several empowering experiences in the students' individual learning paths. Schulz (2004) and Säljö (2002; 2006, pp. 73–90; 2009, pp. 53–64) deepened the understanding of the mediators' tasks in digital learning settings. According to Säljö (2002; 2006, pp. 73–90; 2010, pp. 53–64), technologies not only support learning but also transform it. Based on Schulz's (2004) thoughts, this study suggests that the task of digital mediators is to extend, substitute, or even amalgamate human learning.

The quality of mediators, particularly the quality of interaction between a learner and mediators, is crucial. Qualitative, functional mediators promote learning. Successful learning in web settings requires well-designed mediators. Feuerstein (1991) presented 12 criteria for mediated learning experiences; of these, three are necessary for successful mediated learning. This study suggests that the number of criteria does not need to be fixed because they can vary from one learning situation to another. Instead, teachers and educational providers who are responsible for instruction should be aware of the importance of mediator quality. It is also essential that students become aware of and utilize mediators, particularly when they learn meta-cognitive skills, such as self-regulation in learning.

8.2 Mediators triggering the self-regulative processes

This study found that in self-regulative processes, mediators acted as learning promoters

- The students had a personal kit of learning tools and human support that prepared them for the self-regulative learning process.
- Students were aware that they set their *own pace*, although they were limited to a certain timeframe. They were able to work when they were inspired to and pause when they needed to reflect.
- Students had their *own space* in which they could concentrate in peace without disturbances, in particular if they were easily distracted students.

- Students knew they could keep and create their *own face* in the environment without risking judgment or teasing by anyone in the regular classroom. This was important in particular for those students whose self-esteem was low.
- Students had *human* support from the online teacher, who was available to help them. The online teacher could be trusted because only the teacher could see the students' work and read their personal thoughts. The online teacher also provided guidance if needed and ensured that students did not drop out of from the course.
- Students had *tools* to support their personal learning process. The tests showed students' strengths and weaknesses in their learning strategies and skills, thus enlightening them as learners. The test results suggested assignments based on students' test results so they could learn about and reflect on their study techniques and deepen their insights into themselves as learners. Finally, students had a diary that pushed them to produce and express their ideas and thoughts about themselves as learners.

Tool and human mediators are both needed in web-based environments. It was surprising how important the online teacher was to the students, even though one student stated that "she was not teaching anything." Although some students said they could complete this kind of course without a teacher, they were hesitant and said it was better to have a teacher to monitor them. They clearly saw the role of the human mediator as different from the role of the tool mediator. The tools stimulated the students to learn, reflect and produce own thoughts after looking at the texts and links given in the IQ Learn tutorial.

This study suggests that it might be educationally and economically functional to provide students with tool and human mediation in web-based courses that aim at *personal growth, such as learning self-regulative skills or study counselling*. Human mediation can increase the likelihood that students will complete the course. Because many courses of this kind are optional, their content should be sufficiently motivating and provide regular human contact. The study showed that the students viewed being able to trust and confide in the online teacher as positive. Even if the course content does not require input from the online teacher, the teacher's role can be that of a coach who gives timely feedback. The online teacher's role is to act as a trusted figure, guide, or monitor who reminds and encourages the students to continue the course.

This study suggests that *on conceptual and practical levels*, mediation can act as a bridge to promote understanding about what takes place between the current and next levels of learning (e.g., Vygotsky's [1978] zone of proximal development). The quality of mediation in web-based settings for learning self-

regulation can be improved by examining and evaluating the mediators and the experiences they evoke. Vygotsky's (1978) and Feuerstein's (1990; 1991) basic ideas are more relevant than ever because digital tools change learning and mediators must be identified and evaluated in order to improve learning support in digital settings. The three aspects of mediators—their tasks, quality, and type—comprise an integrated view of their characteristics, which need to be constantly developed and evaluated in digital learning settings.

8.3 The methodological aspects and trustworthiness of the study

The aim of this study was to describe *the types* of mediators students experienced in a socially and culturally constructed learning environment, which was created by the IQ Learn research group at the University of Helsinki. Three qualitative methods (clustering, phenomenological analysis and narrative analysis) were used in the study to examine how students experienced the socially constructed reality of a web-based learning environment. Clustering the data was helpful but did not provide enough insight for the purposes of the study, even though the data indicated that online teachers and the IQ Learn tools acted as mediators. The categorizing process led the researcher to think about how these mediators acted as learning supporters and helped move the research forward, thus bringing the researcher closer to the aim of the research. The researcher thus investigated a socially constructed learning environment with a phenomenological lens in order to build an overall view of *all the experiences that could be counted as mediation*, i.e. learning support. Hedegaard (2009) used phenomenological analysis to investigate socio-cultural phenomena. She drew on socio-cultural approaches from Vygotsky (1978) and Leontjev (1978) and Alfred Schutz's (1970) phenomenological approach to develop a cultural-historical methodology for studying children's development in everyday settings. Hedegaard highlights the research participants' personal experiences and meaning making of social reality relying on Schutz (1970). She has created a dialectical research model stating that the aim of social science research is to illuminate how social reality is explained and lived by humans. (Hedegaard, 2008, pp. 31–35). In addition also Todorova (2011) advocated the phenomenological method when studying a socially constructed reality.

The trustworthiness of the phenomenological analysis depends on the transparency of the method of analysis used. Giorgi's (1985) descriptive phenomenological analysis method is adopted in this study because it is systematic and translucent. This study strived to make all the phenomenological analysis steps as transparent as possible in order to ensure that readers can see what the researcher saw. The study includes transparent descriptions of the

analysis process and students' interview statements; it also describes how different methods were complementary. According to Churchill (2014) "verifiability of phenomenological findings depends on whether another researcher can assume the perspective of the present investigator and see that the proposed insights illuminate the meaningfully illuminate topic of the study" (p. 288). According to Giorgi (1975),

Thus, the chief point to be remembered with this type of research is not so much whether another position could be adopted (this point is granted beforehand) but whether a reader, adopting the same viewpoints as [those] articulated by the researcher, can also see what the researcher saw, whether or not he/she agrees with it. That is the key criterion for qualitative research. (p. 96)

Narrative analysis complemented the phenomenological analysis. This analysis did not change or directly add to the findings from the phenomenological analysis. The two analysis methods each provided a different lens. Each student was examined as a whole in the narrative analysis, while the phenomenological analysis looked for essential experiences that would demonstrate how or what types of mediators could be found. In addition, the narrative analysis also included diary texts and background information for each student in order to gain a more complete picture of the students.

In discussing the differences between phenomenological and narrative analysis, Wertz (2011) notes that phenomenology approaches experience eidetically by looking at the essential, whereas narrative analysis has an interpretative approach. He maintains that phenomenological analysis describes the essential structures evident in individual experiences, whereas narrative research allows 'greater licence of interpretation' (2011, p. 287) than phenomenology. To phenomenologists, the individual's experience is an example of a phenomenon, whereas narrative-oriented researchers value the study of individual lives as such and do not necessarily seek knowledge beyond individual cases (Wertz, 2011, p. 286). Josselson (2011, p. 317) argued that phenomenology strips the text from the original conversation and just focuses on the words. This is partly true; however, phenomenology searches for meaning, not only words, and in the search for the essential, the phenomenologist can lose contact with the context and the individual who said the words. By conducting a narrative analysis, the researcher avoided misunderstanding what students said during the interviews. Looking at each student as a whole provided consistency to the experiences described in the interviews and subsequently to the plausibility of the phenomenological analysis; the benefits of narrative analysis stem from paying more attention to each student's context and life situation. As discussed earlier, Miller (1991) was not satisfied with the regular data coding and

categorization in her research and completed her study using a narrative analysis. Following Miller's (1991) example, this study strived to build a story of the students' learning during the course. However, this study has limitations regarding how much contextual knowledge could be gained for narrative analysis since the thematic interviews were designed to discover mediators and not to gain personal information.

Because this study was an intensive process that aimed to search for mediators in web-based learning, the investigation tended to be very explorative. A new, explorative attitude was used to face an unknown terrain when the researcher adopted the phenomenological approach of looking for the essential. Husserl (1936/1970) expressed this while describing the phenomenological reduction as 'groping entrance into this unknown realm of subjective phenomena' (p. 161). It was necessary to remove from the research process the preset ideas about what is meant by 'mediation', 'mediators' and 'analyse' as well as what the students said. The researcher had to look for the essential before wholly understanding the research question. The researcher understood that the difference between clustering and phenomenological analysis involves finding the essential and that the aim of the latter is not to find cumulative or summative knowledge as such. However, the clustering phase was necessary for the researcher to find what she was seeking. The research question focusing on whether mediators support learning self-regulation remained the same; however, during evaluation of the clustering, the research task changed into what, who or how the students were helped and what kinds of descriptions provided by the students could lead to the mediators.

9 CONCLUSIONS

This study shows that mediators such as *own pace*, *own space*, and *own face* also increase students' likelihood of advancing in their studies. There is a call for new concepts describing or signifying mediators in web-based environments. These mediators were created in an actual study situation that was framed by certain personal choices of time, place, tool, and human support. Even if a substantive part of mediation comprises text-based information and computer prompts in web-based settings, part of mediation is also human-related communication. In this study, the *own pace*, *own space*, and *own face* mediators were digitally empowered mediators that could be regarded as tool mediators because they offered the students control over their study pacing, their study space, and who saw their personal communication in writing. Thus, these mediators enriched the concept of mediators. These types of mediators can also exist in traditional learning settings. However, the role of these mediators in digital environments is very important because technology allows many customized and personalized options. Therefore, they can also be referred to as personal ("own") mediators, although they could also be defined as a special kind of tool mediator.

Learning is not necessarily something that "happens" or takes place without high-level mediation. Therefore, mediation should be investigated in order to find the task, quality, and types of mediators needed in various learning situations; as learning takes place hand-in-hand with mediation, triggering or amplifying the learning process with various mediators.

Inspired partly by Feuerstein (1990, 1991), who highlighted the quality of mediation and partly by the findings of this study, it can be claimed that the quality of mediation needs to be constantly evaluated. New technologies must be studied, interpreted, and used with successful mediation. However, the mediators' task should be fully understood on both the conceptual and practical levels.

9.1 Mediators in the media society

Säljö (2004; 2010; 2012) found three emergent learning issues on the societal level: the educational institutions should respond on the changes in learning, the hybrid level of knowledge need to be understood and different kinds of learners must be integrated in the technological societies. First, Säljö's question (2004, p. 492) of how educational institutions respond to changing learning is of particular importance; this question was discussed earlier in this study. Finding

functional mediators is essential in the context of institutional learning because it is a waste of economic and human resources to offer advanced online tools and courses without obtaining full individual and financial investments. Learning environments change constantly, but mediators are necessary elements in the learning process. Thus, they need to be designed, analyzed, and redeveloped. Second, as noted earlier in this study, Säljö (2010) discussed the hybridity of human learning and knowledge and noted that learning can be integrated with external symbolic storage systems that perform analytical functions (e.g., mindware). This study approaches Säljö's (2010) argument about the hybridity of human knowledge and learning from the aspect of mediation. The hybrid learning and knowledge tools are advanced mediators in the learning process that trigger learners to learn on levels with multiple layers of technology and embedded knowledge. However, learners must be mediated to use these types of high-end learning tools, because these tools will form a new level of hybrid alphabet of many learners in the nearby future.

Third, as presented earlier in this study, Kozulin (2011) and Säljö (2012) addressed the need to include different types of learners in complex technological societies. The study found that marginal groups and students with learning difficulties might benefit from the use of human mediators when studying in digital settings, because human mediators can evoke personal trust and guidance in learners. In addition, advanced tool mediators with individually and/or culturally adapted learning modules can act as mediators for students with learning difficulties.

Varis (2000) referred to the French philosopher Régis Debray, who believed "communication" was a modern but late answer to the more difficult and permanent problem of mediation (p. 194). Media literacy is required for successful learning in the late modern society. On the metalevel, finding high quality mediators is also linked to the global curricula for *media literacy*. It is vital to educate students to become competent in their use of code systems of various modern media (Tornero and Varis, 2011) and who move comfortably between the hybrid levels (Säljö, 2010) of information and learning systems. Tornero and Varis (2011, p. 55), advocate for new humanism, noted the necessity of media literacy and media awareness. Media awareness can lead to discoveries regarding the importance and influence of the media system in everyday life and to the development of necessary competencies. Tornero and Varis (2011) added the dimension of ethics to the new media agenda with their idea of new humanism and called for "a cosmopolitan, universal citizen, with very clear rights and responsibilities, that entail a planet-wide commitment" (p. 44). Media literacy education is a vital part of any institutional education. In addition to having the ability to use media competently, a media literate person should

know about new media and using media ethically and critically. *As a means to promote the agenda of media literacy education*, identifying right kind of mediators is important.

9.2 Future research on mediators

The future research tasks should focus on learners' experiences with mediation in order to identify the mediators in various settings. The hybridity of learning and knowledge must be recognized, and students' experiences with studying in digital settings using new hybrid tools (mediators) should be investigated. Research is needed on which mediators are functional in technology-enhanced instruction and its individual and social learning spaces. Studies are also needed on how technology-based mediators can be adapted to the needs of various groups of learners.

Mediators can be found by studying the learning experiences they induce in learners. In addition, students should "see" their own learning process and reflect on how they learn with digital mediators in order to utilize them fully. As presented earlier in this study, Säljö (2004, pp. 489–494) observed that students' use of digital tools is not necessary optimal and that their understanding of their own learning should improve. More research is needed on how students experience digital mediators and what takes place in students' minds when they use these mediators. Students can learn to use various learning tools, which then challenge them to learn more. They can also reach a more advanced level in their thinking, which encourages them to produce new knowledge. This requires that students become familiar with new ways of learning and that they let digital tools and human mediators assist them. Students need more instruction and encouragement from their instructors or digitally reachable human mediators in the use of digital learning tools. Learners also must gain an improved meta-level understanding about how they learn, think, and become aware of what is possible for them. Based on the results of this study we may conclude that *mediators need to be identified, nominated, or "given names"*, in order to critically study the types of learning experiences they can evoke. However, as stated earlier, mediators are not functional if they cannot evoke progressive learning experiences, regardless of how well the course designers might have pre-structured their role.

This study targeted individual experiences. A significant developmental trend in the future will be personalized learning environments; this trend continues work by many of the researchers reviewed in the beginning of this study. Global, digitally transmitted education is offered, such as instruction via MOOCs. However, the educational background and personal study skills of students in MOOCs are heterogeneous and the dropout rate is higher than that of traditional

education (Clow, 2013). In addition to costly courses that demand good study skills and background knowledge, global and affordable online courses including culturally adapted and targeted mediators are necessary. This requires research on and the development of tool mediators designed to instruct and trigger students as well as human mediators who encourage and urge students to go on with their studies (i.e., mediators who can be asked “stupid” questions).

Learning during this decade includes Web 2.0's joint practices and processes. This study did not target collaboration between students. However, future research should investigate which types of mediators work in socially shared learning settings and how those mediators work. Social media can make many students unsure about themselves. The findings of this study also indicate that it is very important to support and ensure students' personal integrity so they can keep their *own face*. *Along with social learning spaces, individual learning spaces with access to personal support should be fostered*. Although the aim of social media should be to encourage involvement from everyone in the learning process, there is a risk that social, self-assured students will dominate the floor in digital settings. There is a need to carefully monitor the social learning sphere and to research and create mediators triggering positive and cooperative work and a learning spirit among groups of students working together.

This study does have limitations. It was performed in a specific environment and was after pre-studies centered on one course. Future studies concerning the functionality of mediators should investigate various topic areas. Research on digital learning tools has advanced since the 1990s as seen in the short review presented in this study. However, future research should systematically explore how mediators are connected to learning outcomes and how they lead to later developmental levels. It is important to explore how different learners react to mediators. The participants in this study were higher education students. The roles of the mediators found in this study should be tested among various learner groups and age groups.

This study was conducted among first year students of a university of applied sciences. As the Finnish higher education system has two complementary sectors, universities and polytechnics (also called universities of applied sciences) it needs to be pointed out that the results might not be the same if students of “regular” universities would have been investigated. The polytechnics are more directly working life oriented and train professionals in response to labour market needs and they also conduct R&D. The results of this study are not as such generalizable to all higher education university students. However, it needs to be explored into what extent different higher education students, both in universities and polytechnics benefit from the mediators found in this study.

High-quality learning calls for high-quality mediators. With the growing amount of affordable digital mobile devices, well-designed education can be available to everyone worldwide. Carefully designed tool mediators used in conjunction with human mediators are influential instruments that can remarkably improve the individual learning process in digital settings. The ethical duty of all societies is to offer the best possible education for everyone, even if regular schools or higher level educational institutions are not available. Digitally operating human mediators and learner-friendly adaptive tool mediators can support the goal of educational equity.

REFERENCES

- Adey, P., Csapó, B., Demetrio, A., Hautamäki, J., & Shayer, M. (2007). Can we be intelligent about intelligence? Why education needs the concept of plastic generability, *Educational Research Review*, 2, 75–97.
- Adey, P., & Shayer, M. (1994). Really raising standards: Cognitive intervention and academic achievement. London: Routledge.
- Adhami, R. A., & Shayer, M., Twiss, S. (2005). Let's think through maths!: Developing thinking in mathematics with five and six-year-olds. London: NFERNelson.
- Alexander, P. A., Schallert, D. L., & Reynolds, R. E. (2009). What is learning anyway? A topographical perspective considered. *Educational Psychologist*, 44, 209–214.
- Aviram, Y., Ronen, Y., Somekh, S., Winer, A. & Sarid, A. (2008). Self-regulated personalized learning (SRPL): Developing iClass's pedagogical model. *eLearning Papers*, 9. European Commission: Open Education Europa - portal. Retrieved from <http://openeducationeuropa.eu/en/article/Self-Regulated-Personalized-Learning-%28SRPL%29%3A-Developing-iClass%E2%80%99s-pedagogical-model>
- Azevedo, R., & Hadwin, A. (2005). Scaffolding self-regulated learning and metacognition: Implications for the design of computer-based scaffolds. *Instructional Science*, 33, 367–379.
- Azevedo, R., Cromley, J.G., Winters, F.I., Moos, D.C., & Greene, J.A. (2005). Adaptive human scaffolding facilitates adolescents' self-regulated learning with hypermedia. *Instructional Science*, 33, 381–412.
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Clinical and Social Psychology*, 4, 359–373.
- Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Annals of child development. Vol. 6. Six theories of child development*, 1–60. Greenwich, CT: JAI Press.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Beishuizen, J. & Underwood, J. (2011). A conceptual framework for research on self-regulated learning. In Carneiro, R., Lefrere, P. & Steffens, K. (Eds.) *Self-regulated learning in technology enhanced learning environments: A European perspective*, 3–19. Rotterdam: Sense.
- Bliss, J., Säljö, R., & Light, P. (Eds.) (1999). *Learning sites: social and technological resources for learning*. Oxford: Elsevier
- Boekaerts, M., & Cascallar, E. (2006). How far have we moved towards the integration of theory and practice in self-regulation? *Educational Psychology Review*, 18, 199–210.
- Cain, C. (1991). Personal stories, identity acquisition and self-understanding in Alcoholics Anonymous. *Ethos*, 19, 210–253.

- Carneiro, R., Lefrere, P. & Steffens, K. (Eds.) (2007). *Self-regulated Learning in Technology Enhanced Learning Environments: A European Review*. Kaleidoscope Network of Excellence. Retrieved from: <http://hal.archives-ouvertes.fr/docs/00/19/72/08/PDF/STEFFENS-KARL-2007.pdf>
- Churchill, S. D. (2011). Magic carpet ride: Social constructionism in dialogue with phenomenological ontology. *Journal of Constructivist Psychology*, 24(4), 328–332.
- Churchill, S. D. & Wertz F.J. (2014). An Introduction to Phenomenological Research in Psychology: Historical, Conceptual, and Methodological Foundations" in *Handbook of Humanistic Psychology*, (Second, revised, edition), pp. 275–296. Los Angeles, CA: Sage.
- Clandinin, D. & Connelly, M. (2000). *Narrative inquiry: Experience and story in qualitative research*. San Francisco: Jossey-Bass Publishers.
- Clow, D. (2013, April). MOOCs and the funnel of participation. In D. Suthers, K. Verbert (Eds.): *Third Conference on Learning Analytics and Knowledge, LAK '13 in Leuven, Belgium, April 8–12, 2013, 185–189*. Retrived from <http://www.informatik.uni-trier.de/~ley/db/conf/lak/lak2013.html>
- Cognition and Technology Group at Vanderbilt. (1992). The Jasper Series as an example of anchored instruction: Theory, program description, and assessment data. *Educational Psychologist*, 27, 291–315.
- Cohen, L., Manion, L. & Morrison, K. (2000). *Research Methods in Education* (5th ed.). London: Routledge Falmer.
- Colaizzi, P. (1978). Psychological research as a phenomenologist views it. In R. Valle & M. King (Eds.), *Existential-phenomenological alternatives for psychology*, 48–71. New York: Oxford University Press.
- Cole, M. (1996). *Culture in mind*. Cambridge, MA: Harvard University Press.
- Cole, M., & Engeström, Y. (1997). Mind, culture, and activity: Seminal papers from the laboratory of comparative human cognition. Cambridge: Cambridge University Press.
- Collins, S. (2006). A portrait of benchmark school: How a school produces high achievement in students who previously failed. *Journal of Educational Psychology*, 98(2), 282–306.
- Connelly, F. M. & Clandinin, D. J. (2006). Narrative inquiry. In J. Green, G. Camilli, & P. Elmore (Eds.), *Handbook of complementary methods in education research* (pp. 375–385). Mahwah, NJ: Lawrence Erlbaum.
- Creswell, J.W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Dabbagh, N., & Kitsantas, A. (2005). The role of Web-based pedagogical tools in supporting student self-regulation in distributed learning environments. *Instructional Science*, 33, 513–540.
- Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *Internet and Higher Education*, 15, 3–8.
- Davydov, V. V. & Radzikhovskii, L. A. (1985). Vygotsky's theory and the activity oriented approach in psychology. In J. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives*, 35–65. Cambridge: Cambridge University Press.

- Denzin, N. (2006). *Sociological methods: A sourcebook*. New Brunswick, N.J.: Aldine Transaction.
- Devlin, K. (2012, December 4). *The Darwinization of higher education*. [Web log message] Retrieved from http://devlinsangle.blogspot.fi/2012_12_01_archive.html.
- Diaz, R.M., Neal, C.J., & Amaya-Williams, M. (1990). The social origins of self-regulation. In L. Moll (Ed.), *Vygotsky and education: Instructional implications and applications of sociocultural psychology*, 127–155. New York: Cambridge University Press.
- Ewick, P. & Silbey, S. S. (1995). Subversive stories and hegemonic tales: toward a sociology of narrative. *Law Soc. Rev.* 29, 197–226.
- Feuerstein, R. (1972). Cognitive assessment of the socio-culturally deprived child and adolescent. In L. J. Cronbach & P. Drenth (Eds.), *Mental tests and cultural adaptation*, (pp. 265–275). The Hague: Mouton.
- Feuerstein, R. (1981). Mediated learning experience in acquisition of kinesics. In R. Saint-Claire & B. Hoffer (Eds.), *Developmental kinesics. The emerging paradigm*. Baltimore, MD: University Park Press.
- Feuerstein, R. (1990). The theory of structural cognitive modifiability. In B. Presseisen (Ed.), *Learning and thinking styles: Classroom interaction*, (pp. 68–134). Washington, DC: National Education Association.
- Feuerstein, R. (2000). Dynamic cognitive assessment and the instrumental enrichment program: Origins and development. In A. Kozulin & Y. Rand (Eds.), *Experience of mediated learning: An impact of Feuerstein's theory in education and psychology*, (pp. 147–165). Amsterdam: Pergamon.
- Feuerstein, R., & Feuerstein, R. (2005). Learning disability or deficient learning? Permanent trait or changing state. In E. Paldi (Ed.), *Education and challenge of time 2*. Jerusalem: Histadrut Hamorim.
- Feuerstein, R., & Feuerstein, S. (1991). Mediated learning experience: A theoretical review. In R. Feuerstein, P. Klein, & A. Tannenbaum (Eds.), *Mediated learning experience: Theoretical, psychological, and learning implications*, (pp. 3–52). Tel Aviv and London: Freund.
- Feuerstein, R., Feuerstein, R., & Falik, L. (2010). *Beyond smarter: Mediated learning and the brain's capacity for change*. New York, NY: Teachers College Press.
- Feuerstein, R., Feuerstein, S., Falik, L., & Rand, Y. (2002). *Dynamic assessments of cognitive modifiability*. Jerusalem: International Centre for the Enhancement of Learning Potential. (Original work published 1979).
- Feuerstein, R., Rand, Y., Hoffman, M., & Miller, R. (1980). *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore, MD: University Press.
- Finnish Virtual University. (n.d.). *Researching virtual initiatives in education*. Retrieved from http://www.virtualcampuses.eu/index.php/Finnish_Virtual_University
- Gadamer, H. (1989). *Truth and method*. (J. Weinsheimer & D. Marshall, Trans.) (2nd ed.). New York: Continuum. (Original work published 1960)
- Gardner, H. (1985). *The Mind's New Science: A history of the cognitive revolution*. New York: Basic Books.

- Gardner, H. (1993). *Multiple intelligences: The theory in practice*. New York: BasicBooks.
- Giorgi, A. (1975). An application of the phenomenological method. In A. Giorgi, C. Fischer, & E. Murray (Eds.), *Duquesne studies in phenomenological psychology* (vol. 2), 82-103. Pittsburgh: Duquesne University Press.
- Giorgi, A. (1984). The “unfinished business of psychology”. In D. P. Rogers (Ed.), *Foundations of psychology: Some personal views*, 18–34. New York: Praeger.
- Giorgi, A. (1985). *Phenomenology and psychological research*. Pittsburgh, PA: Duquesne University Press.
- Giorgi, A. (1994). A phenomenological perspective on certain qualitative research methods. *Journal of Phenomenological Psychology*, 25, 190–220.
- Giorgi, A. (1997). The theory, practice, and evaluation of the phenomenological method as a qualitative research procedure. *Journal of Phenomenological Psychology*, 28(2), 235–260.
- Giorgi, A. (2006). Difficulties encountered in the application of the phenomenological method in the social sciences. *Análise Psicológica*, 3(XXIV), 353-361. English version retrieved from [www.http://www.scielo.oces.mctes.pt/pdf/aps/v24n3/v24n3a09.pdf](http://www.scielo.oces.mctes.pt/pdf/aps/v24n3/v24n3a09.pdf)
- Giorgi, A. (2009). *The descriptive phenomenological method in psychology*. Duquesne University Press: Pittsburgh, PA.
- Giorgi, A., & Giorgi, B. (2003). The descriptive phenomenological psychological method. In P. M. Camic, J. E. Rhodes, & L. Yardley (Eds.), *Qualitative research in psychology: Expanding perspectives in methodology and design*, 243–274. Thousand Oaks, CA: Sage.
- Guest, G., & McLellan, E. (2003). Distinguishing the trees from the forest: Applying cluster analysis to thematic qualitative data, *Field Methods* 15(2), 186–201.
- Gouzman, R & Kozulin, A. (2011). Helping minority students to succeed in a technological college: A 'round trip' from cognitive functions to curriculum and back. *International Journal of Inclusive Education*, 15, 421–432.
- Hadji, C. (2000). Science, pedagogy and ethics in Feuerstein´s theory and applications. In A. Kozulin, & Y. Rand (Eds.), *Experience of mediated learning: An impact of Feuerstein´s Theory in Education and Psychology* (pp. 21–33). Amsterdam: Pergamon.
- Hadwin, A. F., Wozney, L., & Pontin, O. (2005). Scaffolding the appropriation of self-regulatory activity: A socio-cultural analysis of changes in teacher-student discourse about a graduate student portfolio. *Special Issue of Instructional Science*, 33, 413–450.
- Hamaker, T. & Backwell, J. (2002). *The design, development and implementation of cognitive acceleration through technology education (CATE)*. Design & Technology Association International Research Conference, 12–14 April, 81–90. Retrieved from <https://dspace.lboro.ac.uk/dspace-jspui/handle/2134/3186>

- Hedegaard, M. (2008). Developing a dialectic approach to researching children's development. In M. Hedegaard, J. Fleer, J. Bang & P. Hviid (Eds.) *Studying children: A cultural-historical approach*, pp. 30–45. Maidenhead/New York: Open University Press.
- Hegel, G. W. F. (1969). *Hegel's science of logic*. (A. Miller, Trans.). London: Allen and Unwin. Original: Georg Wilhelm Friedrich Hegel: *Wissenschaft der Logik*. Schrag, Nürnberg 1812–1816. (Original work published 1812/13)
- Heidegger, M. (1977). *The Question Concerning Technology*, in: *The Question Concerning Technology and Other Essays*, W. Lovitt (trans.) (New York, Harper and Row), pp. 3–35. (Original work published in 1954).
- Hickey, D. & McCaslin, M. (2001). Comparative and sociocultural analyses of context and motivation. In S. S. Volet and S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical and methodological implications* (pp. 33–56). Amsterdam: Pergamon/Elsevier.001.
- Husserl, E. (1901). *Logische untersuchungen. Zweiter theil, Untersuchungen zur phänomenologie und theorie der erkenntnis*. Halle a. S.: Niemeyer.
- Husserl, E. (2001). *Logical investigations*. (Ed.) D. Moran, (Trans.) N. Findlay. London: Routledge. (Original work published 1901).
- Husserl, E. (1970). *The crisis of European sciences and transcendental phenomenology*. Evanston, IL.: Northwestern University Press. (Original work published in 1936).
- Introna, L. (2005). Strangers and hospitality: on the social and ethical conditions of virtual communities. In *Ethics of New Information Technologies. Proceedings of the 6th Computer Ethics: Philosophical Enquiries Conference*, p. 229–240. Twente: University of Twente.
- IQ Form. (n.d.). *IQ Form*. Retrieved from http://iqform.it.helsinki.fi/iqform/index.php?node=iq_etusivu_eng
- Josselson, R. (2011). Phenomenological psychology and narrative research. In F. J. Wertz, K. Charmaz, L. M. McMullen, R. Josselson, R. Anderson, & E. McSpadden (Eds.), *Five ways of doing qualitative analysis: Phenomenological psychology, grounded theory, discourse analysis, narrative research, and intuitive inquiry*, (pp. 317–318). Guilford Press.
- Kalima, R. (2011). *Opintojen pitkittyminen ja keskeyttäminen ammattikorkeakouluissa* (Prolonged studies and dropping out in universities of applied sciences). Tampereen yliopisto, kasvatustieteiden yksikkö. Helsinki: Suomalaiset oikeusjulkaisut SOJ.
- Kauffman, D. (2002, April). Self-regulated learning in Web-based environments: Instructional tools designed to facilitate cognitive strategy use, metacognitive processing, and motivational beliefs. Paper presented at conference of the American Educational Research Association, New Orleans, LA.
- Kozma, R. (1994). "Will media influence learning: Reframing the debate." *Educational Technology Research and Development*, 42(2), 7–19.
- Kozulin, A. (1990). *Vygotsky's psychology: A biography of ideas*. Cambridge, MA: Harvard University Press.
- Kozulin, A. (Ed.). (1997). *The ontogeny of cognitive modifiability*. Jerusalem: International Centre for the Enhancement of Learning Potential, ICELP Press

- Kozulin, A. (2003). Sociocultural Theory and the Mediated Learning Experience. *School Psychology International*, (23) 7–35.
- Kozulin, A. (2011). Cognitive aspects of the transition from a traditional to a modern technological society. In P. Portes & S. Salas (Eds.), *Vygotsky in 21st century society: Advances in cultural historical theory and praxis with non-dominant communities* (pp. 65–86). New York, NY: Peter Lang.
- Kozulin, A., Gindis, B., Agejev, V., Miller, M. (Eds.). (2003). *Vygotsky's educational theory in cultural context*. Cambridge: Cambridge University Press.
- Kozulin, A., Gindis, B., Agejev, V., & Miller, M. (Eds.). (2003). *Vygotsky's educational theory in cultural context*. Cambridge: Cambridge University Press.
- Kozulin, A., Lebeer, J., Madella-Noja, A., Gonzalez, F., Jeffrey, I., Rosenthal, N., & Koslowsky, M. (2010). Cognitive modifiability of children with developmental disabilities: A multicentre study using Feuerstein's Instrumental Enrichment-Basic program. *Research in Developmental Disabilities*, 31 (2), 551–559.
- Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA, Sage.
- Kvale, S. (1997). *Den kvalitativa forskningsintervjun* (The qualitative research interview). Lund: Studentlitteratur.
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing* (2nd ed.). Thousand Oaks, CA: Sage.
- Lajoie, S., & Azevedo, R. (2006). Teaching and learning in technology-rich environments. In P. Alexander, & P. Winne (Eds.), *Handbook of educational psychology* (2 ed.), 803–821. Mahwah, NJ: Erlbaum.
- Latva-Karjanmaa, R. (2000). *ATLAS – Atlantic Mobility for Academic Studies in Engineering and Environment*. EU/USA. Co-ordinator's report of the EU/USA e-learning and mobility project: European Commission 2000.
- Latva-Karjanmaa, R. (2002). Mediation in virtual Learning environment. In Niemi, H. & Ruohotie, P. (Eds.). (2002). *Theoretical understandings for learning in virtual university*, 199–146. Hämeenlinna: Research Centre for Vocational Education and Training.
- Latva-Karjanmaa, R. (2008). The roles of tool and human mediators in Web-based course of self-regulation. In Virvou, M, Nakamura, T. (Eds.) (2008). *Knowledge-based software engineering*. Proceedings of the eight joint conference of knowledge-based software engineering. IOS Press: Amsterdam.
- Latva-Karjanmaa, R. (2009, October). *The roles of tool and human mediators in web-based course of self-regulation*. Presentation at the 1st International Symposium on Tangible Software Engineering Education. In Proceedings of 1st. International Symposium on Tangible Software Engineering Education, October 9, 2009, Tokyo International Forum, Tokyo, Japan: (STANS09), pp. 12–16.
- Latva-Karjanmaa, R. & Auvinen, A.-M. (1996). *Erasmus ODL. Open and Distance Learning in the Erasmus programme*. Research report: European Commission .
- Lave, J., & Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge: Cambridge University Press.

- Leontjev, A. N. (1981). *Problems of the development of the mind* (M. Kopylova, Trans.). Moscow: Progress Publishers. (Original work published 1959).
- Lidz, C. S. (1991). *Practitioner's guide to dynamic assessment*. New York: Guilford Press.
- Lidz, C. S. (1995). Dynamic assessment and the legacy of L. S. Vygotsky. *School Psychology International*, 16, 143–153.
- Lieblich, A., Tuval-Mashiach, R., and Zilber, T. (1998). *Narrative research: Reading, analysis, and interpretation* (vol. 47). Thousand Oaks, California: Sage Publications.
- Liotard, J-F. (1984). *The postmodern condition: A report on knowledge*. (G. Bennington & B. Massumi, Trans.) Foreword by F. Jameson. Minneapolis: University of Minnesota Press; Manchester: University of Manchester.
- Mauthner, M., Birch, M., Jessop, J., & Miller, T. (Eds.) (2002). *Ethics in Qualitative Research*. London: Sage Press.
- Maxwell, J. & Miller, B. (2012). Real and virtual relationships in qualitative data analysis. In *A realist approach for qualitative research*, 109–126. Thousand Oaks: Sage.
- McLoughlin, K. & Luca, J. (2002). Learner support in distance and networked learning environments: Ten dimensions for successful design. *Distance Education*, 23, 149–162.
- Merleau-Ponty, M. (1962). *Phenomenology of perception* (C. Smith, Trans.). London: Routledge. (Original work published 1945).
- Miles, M. B. & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd edn.). Thousand Oaks: Sage.
- Miller, B. (1991). *Adolescents' relationships with their friends* (Unpublished doctoral dissertation). Harvard Graduate School of Education, Cambridge, Massachusetts.
- Minick, N. (1997). The early history of the Vygotskian school: The relationship between mind and activity. In M. Cole, Y. Engestrom, & O. Vasquez (Eds.), *Mind, culture and activity: Seminal papers from the laboratory of comparative human cognition*, 117–127. Cambridge: Cambridge University Press.
- Moustakas, C (1990). *Heuristic research: Design, methodology and applications*. Newbury Park, ST: Sage.
- Naidu, S. (2013). Transforming MOOCs and MOORFAPs into MOOLOs. *Distance Education*, 34, 253–255.
- Nevgi, A. (2001). Motivational strategies of students in Virtual University. In *Proceedings of the Evidence-based Policies and Indicator Systems Third International Inter-disciplinary Conference*, 203–219. Durham, UK: University of Durham.
- Nevgi, A. (2002). Measurement of learning strategies: Creating a self-rating tool for students of virtual university. In: H. Niemi & P. Ruohotie (Eds.), *Theoretical understandings for learning in virtual university*, 197–220. Hämeenlinna: Research Centre for Vocational Education and Training.
- Nevgi, A., Niemi, H., & Virtanen, P. (2003). Towards self-regulation in Web-based learning. *Journal of Educational Media*, 28 (2), 51–71.

- Nevgi, A., Virtanen, P., & Niemi, H. (2006). Supporting students to develop collaborative learning skills in technology-based environments. *British Journal of Educational Technology*, 37(6), 937–947.
- Niemi, H. (2000). Why is active learning so difficult? In B. Beairsto, & P. Ruohotie (Eds.), *Empowering teachers as lifelong learners: Reconceptualizing, restructuring and reculturing teacher education for the information age*, 97–126. Hämeenlinna: Research Centre for Vocational Education and Training.
- Niemi, H. & Ruohotie, P. (Eds.). (2002). *Theoretical understandings for learning in virtual university*. Hämeenlinna: Research Centre for Vocational Education and Training.
- Niemi, H. (2002). Empowering learners in virtual university. In H. Niemi, & P. Ruohotie (Eds.), *Theoretical understandings for learning in the virtual university*, 1–37. Hämeenlinna: Research Centre for Vocational Education and Training.
- Niemi, H., Nevgi, A., & Virtanen, P. (2003). Towards self-regulation in Web-based learning. *Journal of Educational Media*, 28(1), 49–71.
- Noë, A. (2004). *Action in Perception*. MIT Press, Cambridge: MIT Press.
- Onwuegbuzie, A. J., Slate, J. R., Leech, N. L., & Collins, K. M. T. (2007). Conducting mixed analyses: A general typology. *International Journal of Multiple Research Approaches*, 1: 4–17.
- Paavola, S. & Hakkarainen, K. (2009). From meaning making to joint construction of knowledge practices and artefacts: A trialogical approach to CSCL. In C. O'Malley, D. Suthers, P. Reimann, & A. Dimitracopoulou (Eds.), *Computer supported collaborative learning practices: CSCL2009 conference proceedings*, 83–92. Rhodes, Greece: International Society of the Learning Sciences (ISLS). Retrieved from <http://www.helsinki.fi/science/networkedlearning/texts/paavola-hakkarainen-2009-trialogical-cscl.pdf>
- Palincsar, A.S., & Brown, A.L. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. *Cognitive and Instruction*, 1, 117–175.
- Paris, S. & Byrnes, J. (1989). The constructivist approach to self-regulation and learning in the classroom. B. Zimmerman & D. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice*, 169–200. New York: Springer.
- Park, J. & Choi, H. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Educational Technology & Society*, 12, 207–217.
- Parr, C. (2013). Africa's mobile phone e-learning transformation. In *Times Higher Education*, 12 September 2013. Retrieved from <http://www.timeshighereducation.co.uk/features/africas-mobile-phone-e-learning-transformation/2007120.fullarticle>.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

- Pea, R. (2004). The social and technological dimensions of “scaffolding” and related theoretical concepts for learning, education and human activity. *The Journal of the Learning Sciences*, 13, 423–451.
- Peirce Edition Project (Eds.). (1998). *The essential Peirce: Selected philosophical writings, Volume 2*. IN: Indiana University Press.
- Pérez Tornero, J. M. & Varis, T. (2011). *Media Literacy and New Humanism*. UNESCO Institute for Information Technologies in Education. Moscow: UNESCO.
- Perry, N., & Winne, P. (2006). Learning from learning kits: gStudy traces of students’ self-regulated engagements using software. *Educational Psychology Review*, 18, 211–228.
- Perttula J. (1993). Fenomenologinen psykologia: kokemuksen systemaattista tutkimusta (Phenomenological psychology: A systematic study of experience). *Psykologia (Psychology)*, 28, 267–274.
- Perttula J. (1995). *Kokemus psykologisena tutkimuskohteena* (Experience as an object of psychological research). Tampere: Suomen fenomenologinen instituutti.
- Perttula, J. (2000). Kokemuksesta tiedoksi: fenomenologisen metodin uudelleen muotoilua (From experience to knowledge: remodeling the phenomenological method). *Kasvatus (Education)*, 31, 428–442.
- Piaget, J. (1995). *The language and thought of the child*. London: Routledge. (Original work published in 1926).
- Pintrich, P. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research*, 31, 459–470.
- Pintrich, P. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation*, 451–502. San Diego: Academic.
- Pintrich, P., & De Groot, E. (1990). Motivational and self-regulated learning component of classroom academic performance. *Journal of Educational Psychology*, 82, 33–40.
- Pintrich, P., & McKeachie, W. (2000). A framework for conceptualizing student motivation and self-regulated learning in college classroom. In P. Pintrich & P. Ruohotie (Eds.), *Cognitive structures and self-regulated learning*, 31–50. Hämeenlinna: Research Centre for Vocational Training Education.
- Pintrich, P. & Ruohotie, P. (2000). *Cognitive constructs and self-regulated learning*. Hämeenlinna: Research Centre for Vocational Education and Training.
- Pintrich, P. R., Smith, D., Garcia, T., & McKeachie, W. (1993). Predictive validity and reliability of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, 53, 801–813.
- Pressley, M. & Ghatala, E. (1990). Self-regulated learning: Monitoring learning from text. *Educational Psychologist*, 25, 91–33.
- Rheinberg, F., Vollmeyer, R., & Rollet, W. (2000). Motivation and action in self-regulated learning. In B. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation*, 503–529. San Diego: Academic Press.

- Riessman, C. K. (2008). *Narrative methods for the human sciences*. Los Angeles: Sage Publications.
- Rogoff, B. (1995). Observing sociocultural activity on three planes. In J. Wertsch, P. Del Rio & A. Alvarez (Eds.), *Sociocultural studies of mind (Learning in doing: Social, cognitive & computational perspectives)*, 139–164. Cambridge: Cambridge University Press.
- Ruohotie, P., & Nokelainen, P. (2000). Modern modeling of student motivation and self-regulated learning. In P. Pintrich & P. Ruohotie (Eds.), *Cognitive structures and self-regulated learning*, (pp. 141–193). Hämeenlinna: Research Centre for Vocational Education and Training.
- Sandbothe, M. (2000). *Enquiries at the Interface: Philosophical Problems of Online Education*. A Special Issue of The Journal of Philosophy of Education, edited by Paul Standish und Nigel Blake, Oxford, Blackwell
- Scardamalia, M., Bereiter, C., & Lamon, M. (1994). The CSILE project: Trying to bring the classroom into World 3. In K. McGilly (Ed.), *Classroom lessons: Integrating cognitive theory and classroom practice*, 201–228. Cambridge: MIT Press.
- Schulz, W. (2004). Reconstructing mediatization as an analytical concept. *European Journal of Communication*, 19(1), 87–101.
- Schunk, D. H. & Zimmerman, B. J. (1997). Social origins of self-regulatory competence. *Educational Psychologist*, 32, 195–208.
- Schwandt, T. A. (2001). *Dictionary of qualitative inquiry* (2nd ed.). Thousand Oaks, CA: Sage.
- Seidman, I. (1998). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (2nd ed.). New York: Teachers College Press.
- Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, 27(3), 4–13.
- Shayer, M. (1997). Piaget and Vygotsky: A necessary marriage for effective educational intervention. In L. Smith, J. Dockrell, & P. Tomlinson (Eds.), *Piaget, Vygotsky and beyond: Future issues on developmental psychology and education*, 36–59. New York: Routledge.
- Shayer, M. (1999). Cognitive acceleration through science education II: Its effects and scope. *International Journal of Science Education*, 21, 883–902.
- Shayer, M. (2003). Not just Piaget, not just Vygotsky, and certainly not Vygotsky as alternative to Piaget. *Learning and Instruction*, 13, 465–485.
- Skuy, M. & Mentis, M. (1992). Application and adaptations of FIE program in South Africa. *Advances in Cognition and Educational Practice*, 18, 105–27.
- Smagorinsky, P. (1995). The social construction of data: Methodological problems of investigating learning in the zone of proximal development. *Review of Educational Research*, 65(3), 191–212.
- Smith, J. A. (2004). Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. *Qualitative Research in Psychology*, 1(1), 39–54.
- Spiegelberg, H. (1972). *Doing phenomenology: Essays on and in phenomenology*. The Hague: Nijhoff.

- Steffens, K. (2006). Self-regulated learning in technology enhanced learning environments: Lessons of a European peer review. *European Journal of Education*, 41, 353–379.
- Sternberg, R. J. (1985). *Beyond IQ: A Triarchic Theory of Intelligence*. Cambridge: Cambridge University Press.
- Sternberg, R. & Grigorenko, E. (2001). All testing is dynamic testing. *Issues in Education*, 7, 185–191.
- Sternberg, R. & Grikorenko, E. (2002). *Dynamic testing*. Cambridge: Cambridge University Press.
- Säljö, R. (1995). Mental and physical artifacts in cognitive practices. In P. Reiman & E. Spada (Eds.), *Learning in humans and machines: Towards an interdisciplinary learning science*, 83–96. Oxford: Pergamon/Elsevier.
- Säljö, R. (1997). The human-technological dialectic: Learning and sociocultural change. *Inaugural lecture, Belle van Zuylen Chair, Faculty of the Social Sciences*. Utrecht University: Research papers.
- Säljö, R. (2000). *Lärandet i praktiken: ett sociokulturellt perspektiv* (Learning in practice: a socio-cultural perspective). Stockholm: Prisma.
- Säljö, R. (2004). Learning and technologies, people and tools in co-ordinated activities. *International Journal of Educational Research*, 41(6), 489–494.
- Säljö, R. (2005). Lärande & kulturella redskap. Om lärprocesser och det kollektiva minnet. (Learning processes and cultural tools. On learning processes and collective memory). Stockholm: Nordstedts Akademiska Förlag. (Norstedts Publishing House).
- Säljö, R. (2010). Digital tools and challenges to institutional traditions of learning: Technologies, social memory and the performative nature of learning. *Journal of Computer Assisted Learning*, 26, 53–64.
- Säljö, R. (2012). Schooling and spaces for learning: Cultural dynamics and student participation and agency. In E. Hjärne, G. van der Aalsvoort, & G. Abreu (Eds.), *Learning, social interaction and diversity - Exploring school practices* (pp. 9–14). Rotterdam: Sense.
- Zimmerman, B., & Schunk, D. (1989). Self-regulated learning and academic achievement: Theory, research, and practice. New York: Springer.
- Tella, S. & Mononen-Aaltonen, M. (1998). *Developing dialogic communication culture in media education: Integrating dialogism and technology*. Media Education Publication 7, University of Helsinki, Department of Teacher Education, Media Education Centre, Helsinki.
- Tenno, T. (2011). *Surffaajat ja syventyjät – verkko-oppimisympäristön pedagogisen rakenteen ja opiskelijoiden toimintaorientaatioiden tarkastelu*. (Surfing and deep learners – a study on the pedagogical structure and students' process orientations in an eLearning environment). Doctoral dissertation. Acta Universitatis Lapponiensis 196. Rovaniemi: Lapin yliopistokustannus. (University of Lapland).
- Tharp, R. & Gillimore, R. (1988). *Rousing minds to life*. New York: Cambridge University Press.

- Tirri, K. & Komulainen, E. (2002). Modelling a self-rated intelligence-profile for the virtual university. In H. Niemi & P. Ruohotie (Eds.), *Theoretical understandings for learning in the virtual university*, 147–175. Hämeenlinna: Research Centre for Vocational Education and Training.
- Todorova, I. (2011). Explorations with interpretative phenomenological analysis in different socio-cultural contexts, *Health Psychology Review*, 5 (1), 34–38.
- Tzuriel, D. (1997b). The relation between parent-child interactions and children's cognitive modifiability. In A. Kozulin (Ed.), *The ontogeny of cognitive modifiability*, 157–180. Jerusalem: International Centre for the Enhancement of Learning Potential, ICELP Press.
- Tzuriel, D. (1997c). A novel dynamic assessment approach for young children: Major dimensions and current research. *Educational and Child Psychology*, 14, 81–103.
- Tzuriel, D. (2000a). Developmental perspectives of mediated learning experience theory. In A. Kozulin & Y. Rand (Eds.), *The experience of mediated learning*, 217–239. New York: Lawrence Erlbaum.
- Tzuriel, D. & Ernst, H. (1990). Mediated learning experience and structural cognitive modifiability: Testing of distal and proximal factors by structural equation model. *International Journal of Cognitive Education and Learning*, 1, 103–117.
- Tzuriel, D., Kaniel, S., Zeliger, M., Friedman, A., & Haywood, H.C. (1998). Effects of the "Bright Start" program in kindergarten on use of mediated learning strategies and children's cognitive modifiability. *Child Development and Care*, 143, 1–20.
- Tzuriel, D. & Weiss, S. (1998). Cognitive modifiability as a function of mother-child mediated learning strategies, mothers' acceptance-rejection, and children's personality. *Early Development and Parenting*, 7, 79–99.
- Underwood, J. & Banyard, P. (2011). Self-regulated learning in technology enhanced learning environments in Europe: Facilitators and barriers to future development. In R. Carneiro, P. Lefrere, K. Steffens, & J. Underwood (Eds.), *Self-regulated learning in technology enhanced learning environments: a European perspective*. *Technology Enhanced Learning*, 5, 155–163. Rotterdam: Sense Publishers.
- Valsiner, J. (1994a). Culture and human development: a co-constructionist perspective. In P. van Geert, L. P. Mos, & W. J. Baker (Eds.), *Annals of Theoretical Psychology*, 10, 247–298. New York: Plenum.
- Van der Veer, R. & Valsiner, J. (1994), *The Vygotsky reader*. Oxford: Blackwell.
- Van Kaam, A. (1966). Application of the phenomenological method. In A. van Kaam (Ed.), *Existential foundations of psychology*. Lanham, MD: University Press of America.
- Van Manen, Max, 1990. *Researching lived experience*. Albany, NY: State University of New York Press (SUNY) Press.
- Varela, F. 1996. Neurophenomenology: A methodological remedy for the hard problem. *Journal of Consciousness Studies*, 3, 330–349.

- Varis, T (2000). Media Education. An Urgent Challenge for Teachers and Teacher Education. In Niemi, H. (Ed.) (1999). *Moving horizons in education. International transformations and challenges of democracy*. Helsinki: Helsinki University Press.
- Von Eckhartsberg, R. (1998). Introducing existential–phenomenological psychology. In R. Valle (Ed.), *Phenomenological inquiry in psychology. Existential and transpersonal dimensions* (pp. 3–20). New York, NY: Plenum Press.
- Vye, N., Schwartz, D., Bransford, J., Barron, B., & Zech, L. (1998). SMART environments that support monitoring, reflection, and revision. In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), *Metacognition in educational theory and practice*, 305–346. Mahwah, NJ: Erlbaum.
- Vygotsky, L.S. (1960). *Razvitiia vysshikh psikhicheskikh funktsii: Iz neopublikovannykh trudov* [Development of the Higher Mental Functions: From the Unpublished Works]. Moscow: Akad. Pedagog. Nauk RSFSR, 1960.
- Vygotsky, L. S. (1972). Problema periodizatsii etapov v detskom vozraste (The problem of stage periodization in child development). In *Voprosy psikhologii* (Problems of psychology) 2, 114–123.
- Vygotsky, L. (1978). *Mind in society*. (M. Cole & V. John-Steiner, Eds.). Cambridge: The MIT Press.
- Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology*, (pp. 144–188). Armonk: Sharpe.
- Vygotsky, L. (1983). Istoriya razvitiya vyschih psikhicheskikh funktsij. In *Sobrabie sochinenij*: Vol. 3 (pp. 5–328). Moscow: Pedagogika. English translation appeared as Vygotsky, L. S. (1997). The history of the development of higher mental functions. (M. J. Hall, Trans.). In R. W. Rieber (Ed.), *The collected works of L.S. Vygotsky. Volume 4: The history of the development of higher mental functions* (pp. 1–251). New York, NY: Plenum Press. (Original work published 1931).
- Vygotsky, L. S. & Luria, A. N. (1994). Tool and symbol in the child development. In R. Van der Veer & J. Valsiner (Ed.), *The Vygotsky reader*, 99–174. Oxford: Blackwell.
- Wertsch, J. (1985). *Vygotsky and the social formation of mind*. Cambridge: Harvard University Press
- Wertsch, J. V. (2008). From social interaction to higher psychological processes: A clarification and application of Vygotsky's theory. *Human Development*, 51, 66–79 (Original work published 1979).
- Wertsch, J. V., & Stone, C. A. (1985). The concept of internalization in Vygotsky's account of the genesis of higher mental functions. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives*, 162–179. New York: Cambridge University Press.
- Wertsch, J., Del Rio, P., & Alvarez, A. (1993). *Voices of the mind: A sociocultural approach to mediated action*. Cambridge: Cambridge University Press.
- Wertz, F. J. (1983). From everyday to psychological description: Analyzing the moments of a qualitative data analysis. *Journal of Phenomenological Psychology*, 14(2), 197–241.

- Wertz, F. (1985). Method and findings in a phenomenological study of a complex life event: Being criminally victimised. In A. Giorgi (Ed.), *Phenomenology and Psychological Research*, 155–216. Pittsburgh, PA: Duquesne University Press.
- Wertz, F. (2005). Phenomenological research methods for counseling psychology. *Journal of Counseling Psychology*, 52(2), 167–177.
- Wertz, F. (2011). Narrative research and phenomenological psychology. In F. J. Wertz, K. Charmaz, L. M. McMullen, R. Josselson, R. Anderson, & E. McSpadden (Eds.), *Five ways of doing qualitative analysis: Phenomenological psychology, grounded theory, discourse analysis, narrative research, and intuitive inquiry*, (pp. 285–289). New York, NY: Guilford Press.
- Williams, P., & Hellman, C. (2004). Differences in online learning between first- and second- generation college students. *Research in Higher Education*, 45, 71–82.
- Winne, P. (2006). How software technologies can improve research on learning and bolster school reform. *Educational Psychologist*, 41, 5–17.
- Winne, P., Nesbit, J., Kumar, V., Hadwin, A., Lajoie, S., Azevedo, R., & Perry, N. (2006). Supporting self-regulated learning with gStudy software: The learning kit project. *Technology, Instruction, Cognition and Learning*, 3, 105–113.
- Yetkin Ozdemir, I. E. (2011). Self-regulated learning from a sociocultural perspective. *Education and Science*, 36, 298–308.
- Zimmerman, B. (1998). Developing self-fulfilling cycles of academic regulation: An analysis of exemplary instructional models. In B. Zimmerman, & D. Schunk (Eds.), *Self-regulated learning: From teaching to self-reflective practice*, 1–19. New York: Guilford.
- Zimmerman, B. (2000). Attaining self-regulation: A social constructive perspective. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Self-regulation: Theory, research, and applications* (pp. 13–39). Orlando, FL: Academic.
- Zimmerman, B. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, 45, 166–183.
- Zimmerman, B. (2000). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation*, 13–39. San Diego: Academic Press.
- Zimmerman, B., & Schunk, D. (Eds.). (2001). *Self-regulated learning and academic achievement: Theoretical perspectives*. Hillsdale, NJ: Erlbaum.
- Zimmerman, B. J., Bonner, S., & Kovach, R. (1996). Developing self-regulated learners: Beyond achievement to self-efficacy. In *Psychology in the classroom: A series on applied educational psychology*, 5–24. Washington, DC: American Psychological Association.
- Zinchenko, V. P. (1995). Cultural-historical psychology and the psychological theory of activity: Retrospect and prospect. In J. V. Wertsch, P. del Rio, & A. Alwares (Eds.), *Sociocultural studies of mind*, 37–55. Cambridge: University Press.

APPENDICES

Appendix A. The course plan

“How do I develop myself as a learner? A guided use of IQ Form”

<p>Translation from Finnish BCNS02 COURSE PLAN</p> <p>HOW DO I DEVELOP MYSELF AS A LEARNER? A GUIDED USE OF IQ FORM</p> <p>Credits: 1 study credit</p> <p>Accomplishment of the course: A report using a learning diary and returning the assignments to the teacher on time.</p> <p>Teacher: Raija Latva-Karjanmaa, raija.latva-karjanmaa@helsinki.fi</p> <p>Period: 19.2.-27.3.2003</p>

<p>WEEK 8</p> <p>Information meeting with the students in a classroom: IQ Form tools for learning¹</p>	<p>Wed.</p> <ul style="list-style-type: none"> - IQ FORM Learning tools - Complete the IQ FORM tests online 	<p>DEADLINES</p> <p>Complete the IQ FORM test this week (week 8)</p>
<p>WEEK 9</p> <p>Online studies</p>	<p>1. Assignment given by the online teacher via email on Mon. 24.2.</p>	<p>Complete the assignment 1, save it to the IQ FORM diary, and send to the online teacher</p>
<p>WEEK 10</p> <p>Online studies</p>	<p>2. Assignment given by the online teacher via email on Mon. 3.3.</p>	<p>Complete the assignment 2, save it to the IQ FORM diary, and send to the online teacher.</p>
<p>WEEK 11</p> <p>Online studies</p>	<p>3. Assignment given by the online teacher via email on Mon. 10.3.</p>	<p>Complete the assignment 3, save it to the IQ FORM diary, and send to the online teacher.</p>

¹ At this phase of IQ Form learning platform development, the entire platform was called IQ Form. Later, the IQ Learn tools and materials were part of a service for the Finnish Virtual University and were named IQ Learn.

WEEK 12 WINTER HOLIDAY		
WEEK 13 Sending the assignments to the teacher with email	4. Assignment given by the online teacher via email on Mon. 17.3.	1. Complete the IQ FORM tests again during week 13. 2. Send all the assignments to the online teacher via diary if you haven't done it earlier.
WEEK 14 The interviews	The teacher agrees about the interview times during the week 14.	The teacher arranges an interview time with you over email.

Appendix B. The IQ Learn environment assignments given by the online teacher

Translated from Finnish

The online teacher emphasized in her email that all the assignments written by the students in the IQ Learn diary were confidential between the student and online teacher and would not be shown to outsiders. In the beginning of the course, the online teacher informed the students that the material would be used in research only. The shortened translation of the content of the emails is as follows.

- **IQ FORM ASSIGNMENT NO. 1, given by the online teacher over email**
 - Complete the tests: Motivation, learning strategies, learning skills and strengths
 - Look at your results which is the weakest: time management, self-regulation, persistence, help seeking.
 - Choose the most interesting assignment from the learning strategies area in the IQ FORM tutorial.
 - Write a minimum of 150–200 words in the IQ FORM diary about the chosen assignment, which is a minimum of 8 to 15 sentences. Save it to the IQ FORM diary.
 - Send it to the online teacher by 28.2.

- **IQ FORM ASSIGNMENT NO. 2, given by the online teacher over email**
 - Ensure that you completes all four IQ FORM tests in the first week
 - Look at your test results in the Strengths area (seven areas of strengths: linguistic, mathematical...).
 - Choose one area you want.
 - Go to the Strengths area in the IQ FORM tutorial
 - Write a minimum of 150–200 words in the IQ FORM diary about the area you want to develop, which is a minimum of 8 to 15 sentences.
 - Send it to the online teacher by 7.3.

- **IQ FORM ASSIGNMENT NO. 3, given by the online teacher over email**
 - Look at your test results in the Learning skills area.
 - In which area would it be useful for you to develop your skills?
 - Study the Learning Skills area in the IQ FORM tutorial and choose an assignment for yourself.

- Write a minimum of 150–200 words in the IQ FORM Diary, which is a minimum of 8 to 15 sentences, and reflect how you can develop your learning skills in the area.
 - Complete the IQ FORM tests: motivation, learning strategies, learning skills and strengths.
-
- IQ FORM ASSIGNMENT NO. 4, given by the online teacher over email
 - Complete the tests in IQ FORM: motivation, learning strategies, learning skills and strengths by 22.3.
 - Next week, I will email you about times for the interview.

Appendix C. Outline for semi-structured interviews

INITIAL CONVERSATION

- The reason for taking the course
- The students' thoughts about developing their studying

HOW WELL WERE THE GOALS OF THE COURSE INFORMED

- a) Through information given by the online teacher, b) Through IQ Form

SELF-KNOWLEDGE AND LEARNING SKILLS

- The students' views about themselves as learners
- IQ Form's possible impact on self-awareness and learning skills
- Writing in the diary
- Returning the assignments to the online teacher

STUDYING IN THE COURSE

- Studying in the web course: good and bad sides.
- Having the study material and assignments online
- The possibility of completing the course without an online teacher
- Was IQ Form a kind of teacher

THE ROLE OF THE ONLINE TEACHER

- The point of having a web-teacher during the course
- Help from the online teacher
- The role of the online teacher

TRANSFER

- How much was familiar during and before this course (regarding learning skills and learning to learn)
- Possible improvements to some learning skills or strategies during the course
- Can things learned during the course be used in the future?

THE MEANING OF THE COURSE

- The usefulness of the course
- The meaning of the course to own development or "growth"
- Other value of the course? Except study credit.
- Awareness about one's strengths and capacity.
- How did it feel to complete the course, and did you think you would be able to do the assignments and complete the course.
- Particularly easy/difficult parts of the course

- Recognition of own skills during the course
- Skills or improvement during the course
- Student strengths and the things that need improvement
- Mastering insecurity through some of the course tasks: tests, tutorial, and diary writing

MANAGING STUDYING

- Time table
- Concentration
- Role of the online teacher in relation to
 - 1) time management, 2) concentration, and 3) finishing the assignments
- Development of study management skills during the web-course
- Web-course and the impact of IQ Form on course management

COULD YOU COMPLETE THIS KIND OF COURSE PURELY ONLINE

What would be the best mode of studies for this kind of topic (learning to learn and learning skills)?

- An online teacher and an online course?
- A classroom course with online assignments?
- An ordinary school course?

WHICH OF THE IQ LEARN TOOLS WAS MOST USEFUL (IQ Learn tests, tutorial, diary)

Could you have completed the course without the online teacher and a “purely” online course or as a course with only one deadline for returning all the assignments?

Appendix D. The phenomenological analysis process: second and third step

1 st step NAÏVE DESCRIPTION Parts of the naïve description of the 1 st step selected for the second phase	2 nd step NATURAL MEANING UNITS	3 rd step 1-11 GENERAL MEANING UNITS Unbolded text: Individual generalized meaning units
Antero: ... In a way, it is nice that you don't have to perform... go there regularly. That you can do it at your own pace... (Student no. 11, male, 6/16). <i>Antero: ...tavallaan on ihan mukavaa silleen, että ei tarvi olla niin ku se... säännöllisesti käyä aina silleen. Että pystyy suorittamaan omalla ajallaan...</i>	Antero said that he enjoyed the fact being able to complete the study tasks at his own pace.	1. Could choose when to study Antero liked studying and accomplishing the study tasks at his own pace.
Pekka: Hmm... Well, in my opinion the good side was that it didn't ... that you could do it on your own time at home... (Student no. 7, male, 7/18) <i>Pekka: Mmm... no, hyviä puolia oli tietysti omasta puolestani se, et se ei sen... et sen pysty tekemään omalla... [...]. Et se niinku... sen pysty tekemään omalla ajalla kotona.</i>	Pekka said it was good for him that he could study on his own time at home.	Pekka said it was good for him that he could study on his own time at home.
Marja: The timing can be problematic, especially since there were some days without classes, so time was an issue... R: Do you have a computer at home? M: Yes, I have a computer at home, but no Internet connection. (Student no. 6, female 13/16) <i>Marja: ... se aika voi olla, kun ei kouluakaan välttämättä ollu, niin se oli, et missä välissä. R: Niin, onks sulla kotona konetta? M: On, kotona on kone, muttei nettiyhteyksiä.</i>	Marja said it was can be problematic with the timing, when there was no teaching some days. She didn't have any Internet connection at home.	To Marja timing of studies could be problematic on days when she didn't attend school, because she did not have Internet connection at home.
Riina: Hmm... It was good that there was some kind of pre-established timetable that you could even modify yourself. (Student no. 3, 11/13) <i>Riina: Mmm... olihan se hyvä, et sieltä tuli jonkin näkönen valmis aikataulu, jota sit pysty viä ite muokkaamaan.</i>	Riina said it was good that there was a pre-set timetable that one could still adjust.	Riina liked the fact that there was a pre-set timetable that she could still adjust.
Pekka: ...It depends on the time of the day, whether or not you have other things going on when you start to work, so it could either be unpleasant or you could really take the time to do it... I could do it when I had the time for it and there wasn't... and I was into it and didn't have other things going on. (Student no. 7, male, 6/18)	Pekka said it depended on the time of the day if he was able to study. If there was some other activities taking place, or if he just was not enthusiastic to study at that time. He could complete the assignments when he	2. Could study when the mood was right For Pekka, whether he was able to study depended on the time of the day. He could complete the assignments when he was inspired and did

<p><i>Pekka: ...se riippuu ajankohasta millon se rupes tekemään, että oliko siinä jottain muuta häslinkiä vielä päälle, että tuntuko se vastemieliseltä vai oliko sitten ihan ajan kanssa. ...minä pystyin tekemään sillon kun mulla oli aikaa siihen, eikä ollu... ja innostusta, eikä ollu muuta päällä.</i></p>	<p>was inspired and didn't have anything else going on.</p>	<p>not have anything else going on.</p>
<p>Jaana: First it was quite difficult, while I'm very bad in creating any kind of text. (...) ...and then that one first had to be in right mood...anyway so that I could have it written. [5/13](...)Well...it was good that you could do it whenever you felt like it, right when you were most inspired to produce text. [6/13] (Student no. 13, female)</p> <p><i>Jaana: ...no aluks se oli aika vaikeeta, kun mie oon hirmu huono luomaan kaikkee tekstiä. (...) sit se, että siihen piti sitten tota... olla semmonen tää...ei mieliala... mut kumminkin siis, että sen sai kirjoitettu. (...) Mmm... no se oli hyviä puolia, että sie sait sen tehä just sillon ku siusta tuntuu, että nyt tulis tekstii.</i></p>	<p>Jaana said that she had to be in the right mood so that she could write the assignmet. It was good being able to study exactly when she felt inspired to produce text.</p>	<p>Jaana had to be in the right mood in order to write. She appreciated being able to study exactly when she was inspired to produce text.</p>
<p>Riina: For one of the assignments, it was difficult to find anything to say, but when you thought about it for a few days, it suddenly came together and you managed to finish it. (Student no. 3, female, 9/13)</p> <p><i>Riina: Oli siä joku tehtävä, ettei meinannu tekstii oikeen tulla millään, mut pari päivää sitä mietti, niin kyllä se sieltä lopulta tuli valmiiks.</i></p>	<p>Riina said that with some assignments, she could first not find anything to say. But when she thought about it for a few days, the text finally surfaced and she completed the assignment.</p>	<p>According to Riina, writing can require days of thinking but suddenly she was managed to complete the assignment.</p>
<p>Mika: If you had tried to do this at school, there would have been all kinds of interruptions, but at home it was easier to think. (Student no. 2, male, 9/11)</p> <p><i>Mika:...koulussa jos yritti tehä, niin saattaa tulla kaiken maailman keskeytyksiä, mut kotona sitä pystyy sit miettimään.</i></p>	<p>Mika said if he tried to do this in school there were all kind of interruptions, but at home it was easier to think.</p>	<p>3. Possibility to concentrate</p> <p>According to Mika, there are interruptions at school, but it was easier to think at home.</p>
<p>Heli: You probably learn things better when you can do them calmly on your own. (...) ... For me it's easier to work at home in peace. (Student no. 12, female, 11/12)</p> <p><i>Heli Ehkä sitä oppii nämä asiat paremmin, kun saa tehdä omassa rauhassa. (...)...helpompi on miusta tehdä kotona nuo omassa rauhassa tai silleen.</i></p>	<p>Heli said she maybe does things better when she can work in peace and it is easier to work at home on her own.</p>	<p>Heli said that she learns things better and easier when she can study in peace at home.</p>
<p>Jaana: Maybe you get deeper into things this way, through the Internet. (...)... when you do it by yourself and you are alone at the computer, even if there are other people around (Student no. 13, female, 6/13).</p>	<p>Jaana said she maybe gets deeper into the things [the course] in this way, via the Internet working on her own, just she and the computer. Even if there were other people</p>	<p>Jaana said she was able to concentrate better working via the Internet. She experienced that she was working on her own with the computer, even if</p>

<p><i>Jaana: ... ehkä paremmin tulis sitten... tai tullee paneuduttua niihin asioihin tälleen, kun... verkon kautta.(...)... että kun sitä ite on sen koneen kanssa tavallaan kahestaan, vaikka oiskin ympärillä muita...</i></p>	<p>around.</p>	<p>there were other people around.</p>
<p>Jouko: It was easy [to concentrate]. I always did them sometime during the evening, so that I could work in peace. So there would be no concentration issues. (Student no. 4, male, 4/14).</p> <p><i>Jouko: Oli, ihan helppo, että mie aina tein ne kotona joskus illalla, et sai niinko ihan rauhassa tehdä. Että ei siin ollu keskittymisessä ongelmia.</i></p>	<p>Jouko said it was easy to concentrate, while he always completed the assignments sometimes in the evening so he could work in peace.</p>	<p>In Jouko's opinion, it was easy to concentrate because he always completed the assignments in the evenings in order to work in peace.</p>
<p>Pekka: ...In fact, I always started to do them in the evening, so that there was no one and nothing to disturb me. You can't do them at school. If I had done them at school, it would have just been quick and sloppy. (...) ...so you were in your own world and you could get more into it and work non-stop without being interrupted. (Student no. 7, male, 16/18)</p> <p><i>Pekka...alotin oikeestaan aina silleen niinku iltasella, ettei silleen niinku ei oo kettään tai ei oo mittään häiriötekijöitä. Että koulussa ei pysty, jos oisin tehny, niin ei ois pystyny, ne ois tullu vaan hutastua. (...)... niin siel oli omassa rauhassa ja pysty niinku siihen perehtymään ja pääs tekemään...</i></p>	<p>Pekka said he always completed the study tasks in the evening when there was no one or nothing disturbing. If he had done them at school, it would have just been quick and sloppy Working in peace enabled him to work straight ahead and focus.</p>	<p>Pekka studied in the evenings when there were no-one or nothing to disturb him. In school, he would have been sloppy with the study tasks. Being in peace enabled him to work focused.</p>
<p>Paavo: ...I liked that it was free-form task [the studying], so you could do it on your own and in peace. (Student no. 8., male, 7/16).</p> <p><i>Paavo: No, hyviä just se, että se on vähän semmosta vappaamuotosta, että saapi ite sitten ihan rauhassa tehdä.</i></p>	<p>Paavo said [studying at the course] was free-form task, one could work on one's own in peace.</p>	<p>4. Informal studying</p> <p>Paavo liked that the course did not include the formality of a classroom course.</p>
<p>Riina: Willingness to try new things. It could be worse [this kind of course in a classroom] because then it is very school-like again. That you have to sort of sit in the theory classes before you get to do the hands-on part. (Student no. 3, female, 2/13)</p> <p><i>Riina: Halu kokeilla kaikkee uutta.(...).Se voi olla ehkä vähän huonompi (koulumuotoinen kurssi), et se on kumminkin menee siihen niin koulumaisuuteen sit taas. Et pakko istuu tavallaan siä teoriatunneilla - sit pääsee taas käytäntöön.</i></p>	<p>Riina said it can be worse to have this kind of [web-based course] in a classroom] because then it is school-like again</p>	<p>Riina said it can be worse to have this kind of course in a classroom because then it is school-like again.</p>
<p>Heli: That you don't necessarily need to sit in the classroom, that you can sort of do it there [in the Internet]. (Student no 12, female, 11/12)</p> <p><i>Heli: Että voi jollain, että ei niinku tarvi tunnilla istuu välttämättä, että voi niinku tuolla.</i></p>	<p>Heli said it is better that one doesn't need to sit in the classroom [in order to study].</p>	<p>Heli liked the fact that she did not need to sit in the classroom in order to study.</p>

<p>Pekka: ...When you need to sort of... write about yourself, your habits and such, it is not a private place [the classroom]... When you work in the classroom, there are other things that can disturb you. (Student no. 7, 15/18)</p> <p><i>Pekka: ...kun pitäis niinku... pitää omasta itestä kirjottaa, omista tavoista ja tämmöstä, niin se ei oo kumminkkaan niinku semmonen yksityinen tila oo sillon luokkatilassa kun tekkee, niin siin on ylimääräsiä häiriötekijöitä sitten mukana.</i></p>	<p>Pekka said when he needs to write about himself, the classroom is not this kind of private place.</p>	<p>5. Having privacy for expression of personal thoughts</p> <p>Pekka said that the classroom is not a private place in situations, when he has to write about himself.</p>	
<p>Paavo: Then again, in a classroom you can't do it in a personal way... can't sort of personally express in that way --- The kind of people go for that kind of [classroom courses] who dare those, who dare to speak about their own... (Student no. 8, male, 13/14)</p> <p><i>Paavo: Sitten taas luokassa ei sillä tavalla henk... pysty niinku henkilökohtaisesti jokkainen sitten tuomaan varmaan sillä tavalla, uskallakaan tuoda esille, eikä haluakkaan, että... (...).Semmoset varmaan siihen hakkeutuu kurssille sitten semmoset, ketkä uskaltaa sitten ääneen omia...</i></p>	<p>Paavo said he can't express these personal things in a classroom.</p>		<p>Paavo said he couldn't express personal things in a classroom.</p>
<p>Raimo: When I did this at home in my own world... Well, it was easier to fully concentrate on it. [11/14] (...) ..in a regular classroom course, you can't think about this kind of personal stuff and feelings in peace. (...) [14/14] (Student no. 5, male)</p> <p><i>Raimo: Kun mie tein tuota tosiaan kotona kaikessa rauhassa, omassa rauhassa, niin... niin tuota siinä pysty hyvin keskittymään sitten. (...) ...koulukursseilla niin ei tuu omia juttuja, tuntemuksia ja noita sillä tavalla mietittyä. (...)</i></p>	<p>Raimo said in a regular classroom course he can't think about this kind of personal stuff and feelings in peace.</p>		<p>In Raimo's view, he cannot think about his personal things and feelings in a classroom course in peace.</p>
<p>Jouko: ...Self-confidence and human relations need improving. . [9/12]. (...) In any case, I think it might be better that they don't impose this kind of knowledge on you. That you discover it by oneself. It is almost more efficient. (Student no. 4, male, 11/12)</p>	<p>Jouko said that his self-confidence and human relations need improving and that this kind of knowledge should not be pushed upon one. It is better to find out by oneself,</p>		<p>Jouko told that his self-confidence was low, but in his opinion it is better that this kind of knowledge is not pushed upon one but found out by oneself instead.</p>

<p><i>Jouko: ..vähän itseluottamus ja ihmissuhteet ja niissä olis parantamisen varaa. . [9/12] (...)</i>On must kummiskin ehkä parempi, että sitä ei niinku tyrkytetä sitä tietoo noissa asioissa, et se niinku ite ottaa sen selville. Se on melkein tehokkaampaa.</p>	<p>which is almost more efficient.</p>	
<p>Kalle: ... I don't know if I'm... Maybe I'm thinking in an old-fashioned way, but in my opinion there always has to be a person who you can connect with in the course. (Student no. 14, male, 10/11)</p> <p><i>Kalle: ... en tiedä oikeen onko sitä... ajatteleeko sitä vanhanaikaisesti, mutta mun mielestä aina pitää olla joku henkilö silleen, että jonka kanssa pystyy sen niinku esmes kurssin yhdistämään ja...</i></p>	<p>Kalle said maybe he is old-fashioned, but he thinks that there always has to be a person to connect a course with.</p>	<p>6. Online teacher as trusted</p> <p>According to Kalle, there should always be a person to connect a course with.</p>
<p>Jouko:... I think it would be better if you could see the teacher... at least once or twice. You would know who you are talking to even if sometimes it seems like there is no teacher, that you are on your own. But anyway, it would be better to know a little more about it. (Student no. 4, male, 10/12)</p> <p><i>Jouko: ...on se must parempi, et sen opettajan niinku näkiskin...(...) ..ainakii sen yhen kerran tai kaks kertaa. Tietää niinku vähän kelle kummiskii puhuu, vaikka se välillä tuntuukin, ettei siin oo opettakaa - sitä tekee itselleen. Mut kummiskii se on ihan hyvä, että tietää vähän.</i></p>	<p>Jouko said in that in his mind it is better that one would see the teacher at least once or twice in order to know whom one is talking.</p>	<p>In Jouko's mind, it is good to see the teacher he is "talking" to at least once.</p>

<p>Antero: ...It felt kind of strange to send my personal things to someone I didn't know... (...) A: Anyway, they were not that personal in the end. Your own study methods, so... [5/16] (...)...It's good that you know from the beginning who will be reading the things, who is watching and why. Otherwise, it would remain kind of superficial on the web, particularly when you have to write this kind of personal stuff... [13/16]. (Student no. 11, male)</p> <p><i>Antero: ... se tuntu silleen, että vähän niin kun tuntemattomalle lähettää jotain omia asioitaan. A: Niin, mutta ei ne kuitenkaan mittään niinku semmosta hirmu henkilökohtasta loppujenlopuks oo. Että omii opiskelumenelmii, että (...)...on ihan hyvä, että aluks tietää, että kuka siellä niitä lukkee, kahtoo ja mikä se on tarkotus. Et se jääpi vähän silleen pintapuolisesti verkossa ja jos pittää vielä kirjoittaa ihan tämmösiä henkilökohtassii enemmän....</i></p>	<p>Antero said it felt kind of strange to send one's own things to an unknown person, but but adds that his study methods were not that personal in the end, being about his study methods.</p>	<p>Antero was a bit uneasy about sending his assignments to a person he did not know.</p>
<p>Marja: I don't know if you can say it's bad that you sort of don't see the teacher. (...) Then you wonder, if you can ask her whatever comes up and whether she would understand it ...? [6/14]. (...)...if you could see the teacher at least once, so you would know who you are doing things for... then you would know who the teacher is. [14/16] (Student no. 6, female)</p> <p><i>Marja: Jos huonoks voi sanoo, että sitä kun opettajaa ei niin kun nää. (...)Et sitte et uskaltaaks siltä kysyy kaikkee mahollista, että ymmärtääkö se sen sitten että...? Se ei nyt missään niin pysty... niinku et opettajaa... kerran ees näkis opettajan, niin tietäis, et kenelle on tekemässä... et minkälainen opettaja on.</i></p>	<p>Marja didn't like the fact that she could not see the teacher, while she didn't know if she dared to ask something. She wondered if the teacher would understand. She would like to see the teacher at least once in order to learn how the teacher is.</p>	<p>For Marja, it was important to see the teacher at least once to learn what kind of person the teacher is, if she dares to ask advice in just anything, and if she understands her.</p>
<p>Anna: ...It was maybe a little easier to write than if there had been a teacher who is...who you know really well and who is always there, so...[6/16](...) ...There are some teachers you wouldn't like to do this with. [7/16]. (Student no. 1, female)</p>	<p>Anna said it was maybe a little easier to write when it was not a teacher she knew. There are some teachers with whom she wouldn't like to study this kind of course.</p>	<p>Anna liked the fact that she wrote to a person she did not know personally and who was not there every day.</p>

<p><i>Anna: ...oli ehkä vähän helpompi kirjoittaa niinku, ku sitte et ois ollu sellanen opettaja, joka on...jonka tuntee tosi hyvin ja on koko ajan paikalla, että...(...)</i></p> <p><i>A: Joo, on joitakin opettajia, että ei niinku haluis tommosta.</i></p>		
<p>Jaana:...Maybe a guide or a controller or someone like that, but not a teacher, since she isn't teaching anything. That the material is then available and you take what you can get from it and ...(Student no. 13, female, 8/13)</p> <p><i>Jaana: Niin, se on ehkä joku ohjaaja tai valvoja tai silleen, että ei nyt opettaja niinkään, koska eihän se nyt tavallaan opeta ite mittään. Että se aineisto on sit siellä ja siitä ite ottaa irti minkä saapi ja...</i></p>	<p>Jaana said the online teacher is maybe a guide or a controller, not a teacher, because she isn't teaching anything.</p>	<p>7. Online teacher as guide</p> <p>According to Jaana, the online teacher is a guide or a monitor, not a teacher, because she is not teaching anything.</p> <p>According to Pekka, the online teacher is [in a way] always there, which is good.</p> <p>Antero saw the online teacher as a guide and adviser if the student had problems.</p> <p>Paavo states that he could have completed the course without an online teacher, but says that with the online teacher it is better.</p>
<p>Pekka: ... A guide or teacher. Of course, the good part it is that if there is a teacher on the Internet, she is always there in a way - sort of. (Student no. 7, male, 8/18)</p> <p><i>Pekka: ...se on lähinnä tukihenkilö kautta opettaja. Tietysti se hyvä puoli siinä on, jos on verkko-opettaja, niin se tavallaan niinku aina paikalla - tavallaan.</i></p>	<p>In Pekka's opinion the good side of the online teacher is that she is always there in a way.</p>	
<p>Antero: Well, it's more like a guide or someone like that who is saying what needs to be done and you can ask questions if you need it, if you don't understand something or don't know how to do it. (Student no. 11, male, 7/15)</p> <p><i>Antero: Kyllä se nyt siihen ohjaukseen ja muuhun mänee, että kertoo, että mitä tehään ja tarvittaessa voi sitten kyssyy, jos ei ihan kaikkee ymmärrä eikä ossaa tehdä.</i></p>	<p>In Antero's mind the online teacher is a guide telling what needs to be done and adviser if one doesn't understand what to do.</p>	
<p>R: Well, could you have completed this course entirely...without any online or this kind of person who gives assignments?</p> <p>Paavo: Well, that could have been possible, if there would have been a more exact description about assignments, the same kind of introduction event package which you gave., [But] In writing, so maybe it could be done, at least with this course. But having an online teacher is surely better [than no teacher], that one can ask questions and give feedback, to explain</p>	<p>Paavo says that maybe he could have completed the course without an online teacher. But with teacher it is better than without, while one can ask advice.</p>	

<p>how the tasks are completed and other such things... (Student no. 8, male 8/16). R: Niin oisit sä voinu suorittaa tän kurssin ihan... ihan ilman et siin ois ollu mitään verkko-opettajaa tai tämmöstä tehtävän antajaa?</p> <p><i>Paavo: Kyllä siinä ehkä ois semmonen mahollisuus, jos siihen tulis tosiaankin joku semmonen tarkempi kuvvaus siitä tehtävästä ja vähän samaan tyyllisen pohjustuksen tekis, ku sie oot pitäny. Ihan silleen kirjallisesti, niin ehkä se sillon onnistus kyllä kuitenkin ainakin tän kurssin osalta. Kyllä se verkko-opettaja siinä varmasti on parempi, että siinä pystyy vähän kyselemään ja anttaan palautetta, että miten ne on tehny ja muuta että...</i></p>		
<p>Raimo: Well, you could do it [without the web teacher], but it's difficult then to... if there's no guidance so... You need to really be motivated to bother to do those...(student no. 5, male)</p> <p><i>Raimo: No, kyllähän sen vois tehdä [ilman, mutta aika hankalaahan siihen on sitten... jos siihen ei mittään ohjattua hommaa oo niin... pitää olla kyllä sitten tosiaan itellä motivaatio aika kohillaan siihen, että viittii tehdä niitä juttuja.</i></p>	<p>Raimo said he could do the course without a teacher, but it would be difficult then with no guidance. In that case one really needs to have the right motivation.</p>	<p>Raimo said he could complete the course without a teacher, but then he really needs to have the right motivation.</p>
<p>Kaija: ...In a way, you are sort of guided, the way it was going forward and what we were doing, making sure the meaning was right. It is independent work, but contact is lacking in a way, the usual contact in a teacher-student relationship, I mean a face-to-face teacher. R: Isn't that a bit of a disadvantage? K: In a way yes and in a way no. Because school isn't like this all the time. It would be, if you attended school via the web. In that case, I would say that something would be missing in order to experience being a student. (Student no. 9, female, 14/25)</p> <p><i>Kaija: Tavallaan siehän ohjasit sen, et miten se etenee ja mitä tehään, että onhan siinä se merkitys justinsa. Että se on itsenäistä työskentelyä, et puuttuu se kontakti tavallaan tietyllä tavalla, mikä tullee niinku normaalisti... niinku opettaja-oppilas</i></p>	<p>Kaija said that the online teacher guided how the student should go forward and what they should do. But she stated that a real teacher contact was missing. Something was missing in order for her to feel like a student.</p>	<p>Kaija said the online teacher acted as a guide, but a real teacher contact was missing.</p>

<p><i>suhteessa, siis kun on läsnä oleva opettaja.</i> <i>R: Eiks se oo vähän negatiivinenkin asia, vai onko?</i> <i>K: Toissaalta on, toissaalta ei. Kun eihän se oo koko ajan tämmöstä koko koulu oo.</i> <i>Sitten se ois, jos koko koulu ois aina tuommosta verkon kautta. Tai mie sanon vaan, että jotain puuttuis, että tuntis että on opiskelija.</i></p>		
<p>Mika: The bad side is the lack of a teacher, if you had a problem, you couldn't ask any questions right away. (Student no. 2, male, 4/11)</p> <p><i>Mika: Huonompia puolia opettajan puute, jos tulee joku ongelma, ei heti välttämättä pysty kysymään.</i></p>	<p>Mika said that the bad side of the course was the lack of a teacher, if there would be a problem and one could ask instantly.</p>	<p>Mika was missing a teacher he could ask for help.</p>
<p>R: ...What was the point of having an online teacher to oversee the studies.... Jussi: I can't say, but there were clear deadlines on when to return the assignment and then also a confirmation that you have received the assignment. (Student no. 10, male, 9/11)</p> <p><i>R: ... mikäs merkitys tällä verkko-opettajalla oli tän kurssin hallinnalle...</i> <i>Jussi: No, en ossaa silleen arvioija, että miun mielestä oli niin selkeet ne päivämäärät mihin pallautetaan ja sitku sulta tuli pallaute aina, että on tullu perille, niin...</i></p>	<p>Jussi said that there were the clear deadlines for when to return the assignment.</p>	<p>8. Online teacher as monitor</p> <p>Jussi said there were clear deadlines for when to return the assignment and a response from the online teacher.</p>
<p>Pekka: In my case, I sort of had to...well, in my case the teacher has to...the online teacher, she has to tell me to do it. If she isn't telling me what the requirements are... I wouldn't do any of it. Now, there were deadlines and criteria on how much you had to write. That sort of helped... (Student no. 7, male, 14/18)</p> <p><i>Pekka:... niin kun minun kohalla ainakin pittää olla tai sen opettajan pittää... on se sitten verkko-opettaja, niin sen pittää vaatii minua, että minä pystyn tekeen. Muuten jos se ei aseta vaatimuksia, niin sitten mulle... mää en teekkään sitten mitään. Tavallaan että nyt oli niin ku määräpäivät kautta tais ollakin viä sana... tai miten se oli kriteerit, että pittää olla sen verran kirjoitettu. Niin se niinku autto siinä...</i></p>	<p>In Pekka's case, the online teacher has to require that the work has to be done, so that he can complete a course. Otherwise he wouldn't do any of it.</p>	<p>The online teacher has to make demands and control Pekka. Otherwise, he will not do anything.</p>

<p>Paavo: It wasn't because of the course but the student's responsibility... You might slip up when no one is there to check up on you...you are sort of in charge that the assignments are done in due time. You can easily forget when there is no contact, someone who's in active contact. [7/16]. (...) ...well it's good that there is someone who watches over. Of course, it wouldn't work with the net only. [8/16]. (Student no. 8, male, 7/16).</p> <p><i>Sitten taas huonona, ehkä se saattaa just...se ei oo sen kurssin huonoutta, mutta tekijän huonoutta...saattaa siihen lipsua siitä, että siin ei kukkaan sillä tavalla oo... siin on niinku ite vastuussa niistä tehtävistä, että ne tullee ajallaan tehtyä. Sillon saattaa helposti kun siinä ei oo semmosta kontaktia, niin ei sillä tavalla oo aktiivisesti yhteyessä, niin siinä saattaa niinku helposti unohtuakin niitä asioita sitten tehdä. (...). et onhan se hyvä, et siinä joku seuraa. Että tietenkin, että se ei tota... ihan sen verkon kans pelkästään.</i></p>	<p>One might slip up with the deadlines, if there is no-one, you are responsible for your assignments alone according to Paavo. When there is no-one who keeps contact actively, you might easily forget to make the things.</p>	<p>Paavo stated that he might slip up or even forget the deadlines. Studying wouldn't work without the monitoring on the online teacher.</p>
<p>Jaana: ...Raw truths about me came up when I did the tests. (...): ...so they probably say something about you. (Student no. 13, female, 4/13)</p> <p><i>Jaana: No joo, kyllähän sieltä nyt raakoja totuuksia tuli, kun ne testit teki. (...). ...tälleen näin, et kai ne aika hyvin näyttää sitten et, kun niihin vastaa.</i></p>	<p>Jaana said raw truths about her came up when she did the tests, and they probably told something about her.</p>	<p>9. Tests providing knowledge about self as learner</p> <p>According to Jaanan "raw truths" about her came up with the tests and they probably told something about her.</p>
<p>Jouko: Yes, the tests... especially if you looked at the test results, you began to see certain things... were also correct most of the time. Some of the tests gave an accurate result, at least in my case... R: Any things that made you ask yourself if you are like that... or did you already know you were like this? J: Well, I already knew most of it. But maybe it revealed that I can be very negative. Sort of downwards when I compare (Student no. 4, male, 4/11)</p>	<p>Jouko said that the test results in particular made him see things about himself and the results were also often quite correct. He said he knew most of the results beforehand but not everything.</p>	<p>The test results made Jouko learn things about himself, and the results were also often quite correct.</p>

<p><i>Jouko: Joo, kyl ne testit... etenkin testituloksia ku katto, niin kyllä sieltä niinku hahmottu ihan semmosii... hyvin monesti ihan täsmäskin oikein. Sieltä joitain kohtii löyty ihan, mitkä anto ihan oikeen tuloksen ainakin omalla kohdalla.4.</i></p> <p><i>R: Oliko ne semmosia, jotka pisti vähän miettii, että oletko sä tollanen... vai ajatteliks sä, et tän sä tiesitkin jo?</i></p> <p><i>J: No, aika pitkälti oli silleen, et kyllä mie ne tiesin. Mut ehkä sieltä sen verran löyty, et mie kummiskin aika negatiivisesti ajattelen. Vähän niinku alakanttiin verrattuna...</i></p>		
<p>Pekka: I had forgotten about that, about performing or talking in public or sort of... When I used to be a group leader, I felt like I could handle it. But then after these tests, when the results show up, you realize it's not like you thought...(Student no. 7, male, 12/18)</p> <p><i>Pekka:... oli unohduksissa semmonen, kun niinku tämmönen julkinen esiintyminen tai esitystaito tai joku vastaava...--- kun ryhmänjohtajana olin, sen jälkeen tuntu, että nyt sekin homma on hanskassa. Mut sitten niitten testien jälkeäen niin se tuloksetkin osotti, että se ookaan silleen niinku, kun oikeesti miettii...</i></p>	<p>Pekka said he had forgot that he doesn't like to perform in public, which the tests reminded him of. He thought that he can already handle it, but the tests results showed otherwise.</p>	<p>Pekka had forgotten that he does not like to perform in public, which the tests reminded him of. He thought he could handle it, but the tests results showed otherwise.</p>
<p>Antero: ...The assignments and tests were done... you wonder if there is anything... if it gives you an accurate idea. (Student no. 11, male, 4/16)</p> <p><i>Antero: ... siinä tehtiin vaan ne tehtävät ja testit muut... onkokaan siitä mitään... saakokaan siitä mitään luotettavaa kuvaa.</i></p>	<p>Antero wondered if the test results were trustworthy.</p>	<p>Antero wondered if the test results were trustworthy.</p>
<p>Kai: Hmm... Well, the tests [best tool] allow you to discover things. [7/11](...). Well, maybe the tests were the most useful part. ... The tests make you get more into it... [11/11] (Student no. 14, male)</p> <p><i>Kai: Mmm... no testihän on silleen [paras työkalu], et siitähän sen huomaa. (...). No, kyllä se ehkä se testit on hyödyllisin niistä. (...)... joutu niin kun panneutumaan eniten niihin testeihin, että silleen...</i></p>	<p>Kai said that he had to focus most when doing the tests and he discovered things via the tests results.</p>	<p>Kai stated that the tests were the best tool. He discovered things through the results and had to focus most when making the tests.</p>

<p>Anna: Assignments made me analyze or reflect on myself after the tests. (15/16). (...)...When you had to think about those things, many other things came up. (...). For example, this critical thinking, so, well, when I did that assignment these kind of things popped into my mind. You noticed that, un-huh, I'm like this and that... Some of my personal features, like how I thought about things and such ...[3/16]. (Student no. 1, female)</p> <p><i>Anna: Piti analysoida sen testin jälkeen, että se autto ainakin mua tuntemaan ittee paremmin ja siis kehittämään näitä opiskelutaitoja. (15/16). (...)...ku sitä niis tehtävissä piti pohtia, niin siitä sitten aukeni monta asiaa...</i></p>	<p>Assignments made Anna analyze or reflect about herself after the tests. Many things came up, when she made the assignments, for example critical thinking.</p>	<p>10. Tutorial: make student analyze self as learner</p> <p>Anna said the tutorial assignments made her analyze and reflect as many things came up, for example critical thinking.</p>
<p>Heli: Yes, that like... there was this kind of question about... what was it about? Something that sort of... if you prefer to look for the kind of information that is not useful for the tests or something, so ...(...) That grasping things or whatever, well, in my view, it is really rewarding, even though the exam may not go so well. (Student no. 12, female, 8/12)</p> <p><i>Heli: Just se että niinku...mikä siellä oli semmonen kysymys, että tota...mikähän siellä oli? Jotain semmosta, että niinku...ettiikö mieluummin semmosta tietoo, mistä ei oo välttämättä siihen kokkeeseen hyötty tai jottain, niin...(...) Silleen, et se oivaltaminen tai joku vastaava, niin kyllä muista se on hirmu palkitsevaa, vaikka se nyt ei meniskään niinku se koe välttämättä hyvin.</i></p>	<p>Heli said she noticed that it is really rewarding to look for information which is not directly necessary for tests or other things. She enjoyed figuring things out.</p>	<p>Heli enjoyed studying issues that were not immediately useful, and she enjoyed comprehending things.</p>
<p>Jouko: ...When you get the assignments and you start to do them, you should really have to take them seriously. If you don't have to work hard on them, it is easy to get off track. So... If the assignments are done well, allowing you to get way into the topic, it works really well. (Student no. 4, male, 5/12)</p> <p><i>Jouko: ... ku annetaan tehtäviä, niin niis täytyy olla silleen, että tehtäviä ku käy tekemään, niin joutuu tosissaan lukemaan sitä. Et jos siihen ei tarvii niin perehtyy, niin</i></p>	<p>Jouko said the assignments have to be the kind that one really needs to study seriously and focus.</p>	<p>Jouko observed that if the assignments are well prepared, the student really needs to focus in them.</p>

<p><i>se niinku tahtoo helpost mennä vähän, et rupee luistamaan niistä. Että... jos tehtävät on suunniteltu hyvin, et siinä joutuu perehtymään asiaan, niin se on must ihan toimiva ratkasu.</i></p>		
<p>Kaija: ...Well, I would say that, well...that it is the assignments. I always thought it's good to have them. That you stop and think, "So, where are we heading?" In my mind, this was a good system. (Student no. 9, 12/25).</p> <p><i>Kaija: ...kyl mie sanon, että tota... siis tässä nää tehtävät just, niin kyl mie oon aina sitä mieltä ollu, että tämmösiä niinku kannattaa olla. Et jossa pysähtyy niinku miettimään, et "haloo, et missä mennään". Et miusta oli ihan mukava tälleen tää kokonaisuus.</i></p>	<p>Kaija valued the assignments and said that it pays to have this kind of exercises in order to stop and think where one is going.</p>	<p>Kaija valued the assignments, because they made it possible to pause and think where she was going.</p>
<p>Jaana: And then when you of course were thinking about the assignments, about what to write and how to write it, you got to think about all different kind of things, so... R: Can you mention any particular eye openers? J: Well yes, maybe the time management and that kind of thing. I noticed that I don't put in much effort...that is, I do the school work only if I have the time. (...). J: I'm not thinking that school work comes before other things. (Student no. 13, female, 4/13).</p> <p><i>Jaana: ... kun niitä tehtäviä mielti, että mistä kirjottaa ja miten, niin tuli ihan siinä mietitty vähän kaikkee erilaisii juttuja, että... (...)</i> <i>...huomasin, että en niinku panosta hirveesti... et se on niinku, että jos kerkiin, niin teen sitten jottain kouluhommia.(...)</i> <i>...eikä sitten niin päin, että ensin kouluhommat ja siten muut.</i></p>	<p>When doing one assignmen in the tutorial Jaana noticed that she doesn't put much effort in the school work.</p>	<p>Through one assignment in the tutorial, Jaana noticed that she did not put much effort into the schoolwork.</p>
<p>Raimo: In my opinion, in the [diary] one, you got to reflect on this really deeply.... (15/15). (Student no. 5, male).</p> <p><i>(...)Miun mielestä se, et siitä [päiväkirja] tuli kaikkein syvällisimmin pohdiskeltua tätä asiaa...</i></p>	<p>In Raimo's opinion one gets to reflect deepest with the diary.</p>	<p>11. Diary make students produce own thoughts</p> <p>In Raimo's opinion, one reflects deepest with the diary.</p>
<p>Pekka:...When you were writing the diary, you really had to think and this let your thoughts flow. (Student no. 7, male, 6/18)</p>	<p>Pekka said that writing in the diary made Pekka really to reflect and his</p>	<p>Writing in the diary made Pekka really to reflect and his thoughts to flow.</p>

<i>Pekka: ... kun sitten kirjotti päiväkirjaan, niin siinä piti sitten miettiä se niinku silleen ajatuksia laitto myllertämmään.</i>	thoughts to flow.	
Paavo: Things don't come out just like that. You have to think it over before writing. You really have to think about it, so... (Student no. 8, male, 7/16) <i>Paavo: Kyllä siinä, että ei se ihan itestään tuu se. Pittäähän niitä miettiä ennenku kirjottaa. Kyllä siinä joutuu pohtimaan niitä, että...</i>	Paavo said the thoughts do not come out by themselves, and one must think it over before writing.	Paavo said one must think things over before writing.
Jaana: When I first tried to write, nothing came out, but it was much better the next time.)(...) Well, you might be reflecting on it subconsciously, so...(...). and then another day it just comes out better and you write the text. So that's not just like whoops. (Student no. 13, 4-5/13) <i>Miekii niin kokkeilin aina kirjottaa ja ei tullu ei yhtään mitään, ja sit seuraavana tulikin sit paljo paremmin. (...) Niin, se voi olla, että sitä ajattellee sitä alitajunnassa jollain tavalla....(...) ...sitten tota toisena päivänä vaan tullee paremmin tekstii ja silleen. Että se ei oo semmosta töks.</i>	Jaana said that first it was quite difficult to write, because she is bad at writing any kind of text. The thoughts had to mature before writing. They didn't appear easy or at once.	Jaana said that first it was difficult to write, because she is weak at writing and that the thoughts had to mature before she wrote.
Riina: You really have to think about things, but there are [usually] never any documents about what you really have thought about. Now everything is saved there [in the diary] since you really had to write your thoughts. [12/13] (Student no. 3, female). <i>Riina: asioita tulee mietitty paljon, mut sit ei jää mitään dokumentteja, mitä sitä on oikeesti miettiny. Nyt ne on kaikki siä tallessa ja oikeesti pitänyt kirjottaa ne.</i>	Riina said she really have reflect things a lot, but usually there is no documents left about what she has been thinking. Now all these thoughts were saved in the diary and she really had to have written them.	Riina said that usually there were no documents left about the things she had been thinking. Now, all these thoughts were saved in the diary.
Marja: Sometimes it was difficult but once you got it going, it worked. (Student no. 6, female, 5/16) <i>Marja: Väliillä vähän vaikeelta. Mut sitku alkuun pääsi, niin sitten tuli kyllä.</i>	Marja said sometimes writing [in the diary] was difficult but once she got it going she could manage it.	Sometimes it was difficult to write in the diary in Marja's mind, but once she got it going, she could manage it.
Anna: ...When you wrote [to the diary] that made you reflect on those things, and you always thought like uh-huh, start here, and then new things appeared again. [3/16] (Student no. 1, female).	When Anna wrote to the diary even the writing made her reflect and new things were revealed.	Writing in the diary made Anna reflect and notice new things about herself.

<p>...kun niitä kirjoitti niitä juttuja, niin kyl siinä aina mietti sitten niinku, että "ahaa, että tästä", niin siitä aukeni sitten taas joitakin asioita.</p>		
<p>Mika: ...You were able to kind of think a little deeper about some of the stuff before you wrote about it and that way, the answers become clearer. (Student no. 2, male, 9/11)</p> <p><i>Mika: pystyy tekemään näitä tehtäviä vähän omalla ajalla. Ja pystyy just silleen niinku miettimään ennen kirjottamista, niin vähän syvemmin niitä asioita ja sit tuloo ehkä selkeempiä vastauksiakin.</i></p>	<p>Mika said when using the diary he was able to kind of think a little deeper about things before writing and that way the answers became clearer.</p>	<p>By using the diary, Mika was able to think more profoundly before writing and could express himself clearer.</p>
<p>Jouko: It is sort of like... well, the web kind of disappears there if it [the studying] is only done in the classroom. Then it doesn't matter if it's there or not. (Student no. 4, male 11/12)</p> <p><i>Jouko: Siinä vähän semmone... no, se verkko oikeestaan häviääkin siitä, jos sitä täällä luokassa tehdään. Et se on sit ihan sama, et onks se vai ei.</i></p>	<p>Jouko said that the net kind of disappears the if it is used in the classroom</p>	<p>In Jouko's mind, the web disappears if he works with the computer in a classroom.</p>

Appendix E. Two examples of students' narrative profiles

Based on interviews, diary texts, and background information given by the students

Student no. 5. In a regular classroom course, one cannot think about this kind of stuff

Raimo is a male student, born in 1981, with a high school background. The main reason he attended this course was the study credit, but he was also curious about his study techniques. The interviewer gets an impression of a student who studies at "comfort level" and does not work too hard, but at the same time, he is critical about teaching and needs to be challenged in his "laziness." The *background information* reveals that he expects to gain a broad education in computing at Karelia UAS. He thinks he is a good student but he needs more self-confidence. In the *interview*, Raimo said he knows himself well. He could do even better in school, but he is satisfied with medium credits. Raimo also said he is average and not particularly good in anything.

However, one *diary assignment* reveals that he is quite talented and ambitious in his studies. But he wants to be comfortable and not work too hard. He writes that he monitors his grades and progress, decides on his goals, and tries to reach them with as little effort as possible. In the *diary*, he also states that he lacks self-confidence. The lack of self-confidence was not as obvious in the interview.

He also writes that he is trying to make it quite easy for himself and tries to balance his urge to be comfortable with his ambitions. He also writes that if he believed more in himself and his success he could do the exercises more confidently and get better study results.

The course helped him with test preparation and test anxiety. The course made him reflect on things, which was possible due to studying in peace. The course made him think about "his own stuff."

Raimo: When I did this at home in my own world... Well, it was easier to fully concentrate on it. [11/14] (...) ..in a regular classroom course, you can't think about this kind of personal stuff and feelings in peace. (...) [14/14] (Student no. 5, male)

He liked the tutorial (assignments) and diary tool best (to him they were the same thing) because with them he could reflect deeper. The student said in the *interview* that he thought he could complete this kind of Internet course on his own if all the assignments were clearly found. However, when asked one more time at the end of the interview, he said it would be better with an online teacher.

The role of the online teacher is to guide with the assignments, give feedback, and encourage.

Raimo: Well, you could do it [without the web teacher], but it's difficult then to... if there's no guidance so... You need to really be motivated to bother to do those...(student no. 5, male)

R: Mmm, well, if you think about this kind of course, then obviously you would... would it be a little better, if it would be a web course together with a online teacher or...?

Raimo: Well it's is better in my mind that there is someone like that.

R: So that it becomes done?

Raimo: yes,

R: is there something else except getting it done?

Raimo: ...I would say, that one gets certain encouragement. That there is someone to ask advice, if one doesn't know.

Student no. 7. A private place is needed for thinking and a teacher is also necessary for control

Pekka, born in 1982, has completed the sports high school (*lukio*). He says the study credit was his main reason for taking part in this course, but also the fact that the course was different and one did not need to learn by rote. The interviewer gets an impression of a social, talented, and impulsive student who obviously needs more challenges. His examination results vary from very low to the very high, depending on the subject (he does not want to read). In computer-based courses, he gets high grades. He says in the *interview* that he is a lazy student who leaves everything to the last minute, he does not like to read, and his grades in reading-based subjects are low. In the diary, he writes that he learns the things he is interested about easily, but he is lazy and selective concerning the things he should learn. This is then reflected in test grades. Based on them, he notices that he should have studied more carefully. His *background information* shows that he expects the study program to have certain challenges relating to work with computers. He did not learn anything new during the course. But he writes in the *diary* that the motivation area got him to think different, that he should put some more effort in the studies. However neither that can change his studying habits in his opinion. He believes he cannot manage his studies until the end because in some phase there will be an invincible barrier

that he can't overcome. Regardless of "not learning anything new," he says at the beginning of the *interview* that IQ Learn made him reflect on his own about what goes well and where there are some problems, and writing about these things activated his thinking,

During the *interview*, Pekka states that one needs a private place for this kind of course. He says that he could not do these kinds of assignments at school instead of home in peace. Having personal space and his own space was good because he could concentrate. Personal space is better when one has to write about oneself and one's own habits because the classroom is not a private place and there are some extra disturbances there. One could write one's thoughts in peace. In school, he would just have talked with his friends while his thoughts would be on other things, and the assignments would have been done sloppy.

Pekka: ...In fact, I always started to do them in the evening, so that there was no one and nothing to disturb me. You can't do them at school. If I had done them at school, it would have just been quick and sloppy. (...) ...so you were in your own world and you could get more into it and work non-stop without being interrupted. (Student no 7, male, 16/18)

Pekka: Mmm...In my case it's better [with a web-based course in this kind of topic] so one is able to concentrate on the tasks, when one needs to sort of...write about oneself, one's own habits and this kind, so it is not this kind of place if one makes in a classroom space, there are additional disturbing factors then. (Student no. 7, 15/18)

The tests were the best IQ Learn tool because they made him reflect. He says in the *interview* that he used to check in the diary what he had wrote in a prior assignment, and this made him get going on the same model of thought.

R: Was there a particular section, a test or an assignment which would have brought your... awaken some thoughts?

Pekka: I don't remember, if there was particular. But, yes, now I remember that each assignment in a way ... when you were writing the diary, you really had to think and this let your thoughts flow. (Student no. 7, male)

Pekka says in the *interview* that a good side of the IQ Learn course is that it did not disturb other studies because he could do it when it pleased him. IQ Learn interested him because it was a different kind of course with no book reading. However, the course may have been too easy for him. He says he needs an online teacher to control and demand that he complete work. When there was someone to receive the assignments, he felt that he had to complete the assignments properly. The online teacher as a controller is a requirement (for his kind of student) in terms of deadlines, criteria, and how much (minimum) to write. The

online teacher was also a good thing because she was always there. One could send questions and ask at any time.

Pekka: In my case, I sort of had to...well, in my case the teacher has to...the online teacher, she has to tell me to do it. If she isn't telling me what the requirements are... I wouldn't do any of it. Now, there were deadlines and criteria on how much you had to write. That sort of helped... (Student no 7, male, 14/18)