

**ACHIEVEMENT GOALS AND
COGNITIVE LEARNING
STRATEGIES IN DYNAMIC
CONTEXTS OF LEARNING**

**HANNA
SALOVAARA**

Faculty of Education,
Department of Educational Sciences
and Teacher Education,
University of Oulu

OULU 2005

Abstract in Finnish



HANNA SALOVAARA

**ACHIEVEMENT GOALS AND
COGNITIVE LEARNING STRATEGIES
IN DYNAMIC CONTEXTS OF
LEARNING**

Academic Dissertation to be presented with the assent of
the Faculty of Education, University of Oulu, for public
discussion in Kaljusensali (Auditorium KTK 112),
Linnanmaa, on June 18th, 2005, at 12 noon

OULUN YLIOPISTO, OULU 2005

Copyright © 2005
University of Oulu, 2005

Supervised by
Professor Sanna Järvelä

Reviewed by
Professor Eero Ropo
Professor Timothy Urdan

ISBN 951-42-7762-7 (nid.)
ISBN 951-42-7763-5 (PDF) <http://herkules.oulu.fi/isbn9514277635/>
ISSN 0355-323X <http://herkules.oulu.fi/issn0355323X/>

OULU UNIVERSITY PRESS
OULU 2005

Salovaara, Hanna, Achievement goals and cognitive learning strategies in dynamic contexts of learning

Faculty of Education, Department of Educational Sciences and Teacher Education, University of Oulu, P.O.Box 2000, FIN-90014 University of Oulu, Finland
2005
Oulu, Finland

Abstract

This study investigates secondary school students' motivational achievement goals and cognitive learning strategies in inquiry-based computer supported collaborative learning. The study undertakes a contextual approach where students' context specific interpretations are highlighted. Achievement goals and cognitive learning strategies are introduced within a theoretical framework of self-regulated learning to explain their interrelationship and magnitude within a learning process. The research design was a longitudinal, quasi intervention design involving multiple methods, namely quantitative self-reports and qualitative process oriented interviews. Empirical parts of the study are reported in four individual articles.

The purpose of Study I was to recognise strategic patterns emerging in students' computer supported collaborative inquiries. The results indicated that strategies were adjusted according to the demands of the learning situation. Although students' inquiry processes were dominated by surface-level strategies, also deeper level and metacognitive strategies were reported.

Study II investigated students' use of cognitive learning strategies in two pedagogically different learning contexts. The results suggest that inquiry-based computer supported collaborative learning activities may enhance the use of deeper level cognitive strategies, such as monitoring, sharing information and creating representations.

Study III examined the changes in students' motivational achievement goal interpretations and the situational dynamics of students' goals and strategies over a period of three years. The data show how the students' interpretations of their goals and strategies vary during different years of the study. The students seem to develop both individual and contextual goals, as well as strategies, to self-regulate in the new pedagogical culture.

Study IV looked at the congruence between students' general achievement goals and their context specific goals. The findings indicate incongruence between general level goal orientations and contextual goal interpretations and, thus, underline the importance of subjective interpretations of achievement goals.

The results indicate that both achievement goals and cognitive learning strategies have contextual characteristics and illustrate the need to understand the interplay of motivational and cognitive processes. The results also show the importance of longitudinal research for pointing out some of the motivational and cognitive effects of the pedagogical interventions. Finally, the results of the study suggest that the social dimension of students' cognitive and motivational processes and self-regulation should be studied in more detail.

Keywords: cognitive strategies, educational psychology, elementary education, learning, motivation

Salovaara, Hanna, **Motivatioonalliset tavoitteet ja kognitiiviset oppimisstrategiat oppimisen dynaamisissa konteksteissa**

Kasvatustieteiden tiedekunta, Kasvatustieteiden ja opettajankoulutuksen yksikkö, Oulun yliopisto, PL2000, 90014 Oulun yliopisto

2005

Oulu, Finland

Tiivistelmä

Tutkimuksessa tarkastellaan yläasteen oppilaiden motivaatioonallisia tavoitteita ja kognitiivisia oppimisstrategioita tietokoneavusteisen kollaboratiivisen oppimisen sekä tutkivan pedagogisen lähestymistavan periaatteita noudattavissa oppimistilanteissa. Teoreettisesti tutkimus nojautuu sosiokognitiiviseen näkemykseen oppimisesta ja korostaa kontekstuaalista lähestymistapaa, jossa painotetaan oppijoiden yksilöllisten ja kontekstiin sidottujen tulkintojen merkitystä. Taustalla on näkemys oppimisen kontekstien ainutlaatuisuudesta, jatkuvasta muuttumisesta ja dynaamisuudesta, joka puolestaan vaikuttaa oppimisen motivaatioonallisiin ja tiedollisiin prosesseihin. Tutkimus koostuu neljästä itsenäisestä empiirisestä artikkelista sekä tutkimuksen teoreettisen taustan, tavoitteet, menetelmät ja tulokset kokoavasta yhteenveto-osasta. Tutkimuksen teoreettisessa osassa pyritään hahmottamaan motivaatioonallisten saavutustavoitteiden sekä kognitiivisten oppimisstrategioiden välisiä yhteyksiä sekä niiden merkitystä oppimisprosessin kokonaisuudessa. Tutkimuksen keskeiset käsitteet, motivaatioonalliset tavoitteet ja kognitiiviset oppimisstrategiat esitetään osana oppimisen itsesäätelyn teoreettista viitekehystä.

Kolmivuotisessa tutkimuksessa toteutettiin pedagoginen interventio, jossa ryhmä oppilaita työskenteli yläasteen ajan tietokoneavusteisen kollaboratiivisen oppimisympäristön tukemana tutkivan oppimisen mallia noudattaen äidinkielen tunneilla. Oppilaiden motivaatioonallista ja kognitiivisia oppimisstrategioita tarkasteltiin useiden menetelmien avulla. Pääosan tutkimuksen aineistosta muodostavat oppilaiden toistetut kvantitatiiviset itsearviot sekä kvalitatiiviset prosessisuuntautuneet haastattelut.

Kokonaisuudessaan neljässä empiirisessä artikkelissa raportoidun tutkimuksen tulokset osoittavat, että sekä motivaatioonallisiin tavoitteisiin että kognitiivisiin oppimisstrategioihin liittyy tilannesidonnainen ulottuvuus, jossa oppijoiden omilla henkilökohtaisilla tulkintoilla on suuri merkitys. Lisäksi tutkimuksen tulokset kuvasivat motivaatioonallista ja kognitiivisten strategioiden vuorovaikutusta oppimisessa ja nostivat esiin tarpeen tarkastella oppimista eri osaprosessien välisen dynamiikan kautta. Tutkimuksen pitkittäistulokset osoittavat pitkäjänteisen tutkimuksen olevan tarpeen pedagogisten interventioiden sekä oppimiskontekstien dynamiikan tutkimisessa. Erityisesti haastatteluaineistosta esiin nostetut tulokset osoittavat sosiaalisen kontekstin merkitystä oppimisen kognitiivisissa ja motivaatioonallisissa prosesseissa sekä oppimisen itsesäätelyssä.

Asiasanat: kognitiiviset strategiat, motivaatio, oppiminen, tavoitteet, yläaste

Acknowledgements

Conducting a PhD study is like a journey from a state of being a beginning novice to a state where deepening levels of expertise start to develop. The journey involves moments of joy and inspiration but is by no means straightforward or smooth. However, the happy thing is that I was not alone in this journey and I had the privilege to share some of the moments of this journey with different people.

I want to express my gratitude to Professor Sanna Järvelä who has been the supervisor of my PhD study. She has introduced me to the academic work including the daily hard work as well as the academic highlights. Getting to be involved in different academic efforts with her has made me to see that my work is relevant and meaningful.

I am grateful to the reviewers of the thesis, Professor Timothy Urdan and Professor Eero Ropo. I truly feel that their valuable comments and critical questions have helped me to learn more about the themes addressed in the study. I highly appreciate Professor Urdan's work on achievement goal research and therefore I feel privileged to have received his comments on my thesis.

I feel that Maarit Saarenkunnas has been the most important dissertation buddy for me and I want to give my warm thanks for her. During the years we worked together in the Unit of Educational Technology, she made me to diversify my thinking in a meaningful way and provided me plenty of support in various issues.

During my PhD studies, The Research Unit of Educational Technology has been the "university home" to me. Thus, all of the colleagues and friends who work or have been working there during the recent years get my sincere thanks for providing me daily support. In addition to that, I want to express my appreciation for Piritta Leinonen, Hanna Järvenoja and Johanna Bluemink for the shared academic experiences that have contributed to my PhD studies.

There are also several other colleagues, especially other PhD students working in KASVA, in the Department of Educational Sciences and Teacher Education who I want to thank. Professor Leena Syrjälä receives my respectful thanks for providing me encouragement and advice in my academic efforts. I also want to thank Leena Kuure and Merja Ruotsalainen. Discussions with them have been valuable for me.

This work has been enriched by collaboration with different national partners from different Finnish universities. Thus, I want to thank people in the Centre for Learning Research at the University of Turku, Päivi Häkkinen's research group from University of

Jyväskylä, and in the Centre for Research on Networked Learning and Knowledge Building at the University of Helsinki. Theoretical, methodological and informal exchange with these colleagues has developed my thinking in a valuable way.

There are also many international collaborators who have shared their expertise with me and supported my work. I want to express my thanks to Professor Jesus Alonso-Tapia from Universidad Autonoma de Madrid for offering me a possibility to visit his university for a year. I am grateful for Professors Michaela Gläzer-Ziguda and Roy Clariana who devoted some of their time for commenting my papers.

I am grateful for Finnish National Research School in Education, The Finnish Cultural Foundation and Academy of Finland for giving financial support for my work.

There are several friends, such as Pia Ylimäki, Johanna Leskelä and Meeri Ojala, who I want to thank. Their friendship has been truly meaningful for me during the last years.

I want to express my warm thanks to my family including my mother, grandmother, sister and my husband's parents. They have all helped me and my family with many truly important things including both practical and spiritual aspects.

Finally, I want to thank my dearest ones; my husband Ari and my two beloved children. Considering my academic efforts I want to acknowledge Ari for his overarching support including both emotional and rational aspects. Thank you three for making my life so meaningful.

Oulu, May 2005

Hanna Salovaara

List of articles

This dissertation is based on the following articles, referred to in the text by their Roman numerals:

- I Salovaara, H., & Järvelä, S. (2003). Students' strategic actions in computer supported collaborative learning. *Learning Environments Research*, 6, 267-285.
- II Salovaara, H. (2004). An Exploration of Students' Strategy Use in Inquiry-Based Computer Supported Collaborative Learning. *Journal of Computer Assisted Learning*, 21, 39-52.
- III Järvelä, S., & Salovaara, H. (2004). The interplay of motivational goals and cognitive strategies in a new pedagogical culture. *European Psychologist*, 9, 232-244.
- IV Salovaara, H., & Järvelä, S. (2005). *Longitudinal analysis of motivational goals and self-regulation – Contrasting self-reports and process-oriented interviews*. Submitted for publication.

Table of contents

Abstract	
Tiivistelmä	
Acknowledgements	
List of articles	
Table of contents	
1 Introduction	13
2 Theoretical framework	15
2.1 Definitions of self-regulated learning	15
2.1.1 Achievement goals and cognitive strategies within the framework of self-regulated learning	17
2.1.2 The role of context in self-regulated learning	18
2.2 Cognitive learning strategies	20
2.2.1 Definitions of cognitive learning strategies	21
2.2.2 Scope of cognitive learning strategies	22
2.2.3 Variety of cognitive learning strategies	23
2.2.4 Cognitive strategies in learning context	25
2.3 Achievement goal perspective on motivation	26
2.3.1 Different levels of goals	27
2.3.2 Adoption of goals	28
2.3.3 Achievement goal theory	29
2.3.4 Classroom goal structure and students' achievement goals	31
2.4 Interplay of achievement goals and cognitive learning strategies	33
2.4.1 Achievement goal orientation, cognitive strategies and adaptive learning behavior	33
2.4.2 Composition of motivational and cognitive processes within a learning context	35
2.5 Designing dynamic learning contexts that foster self-regulated learning, use of cognitive learning strategies and motivate learners	36
2.5.1 Activating self-regulation by classroom structures	37
2.5.2 Self-regulation in technology-rich learning contexts	39
3 Methods for investigating motivation and cognitive strategies in context	42
3.1 Self-reports as dominating methods in the field	42

3.2 Using qualitative methods for investigating learning processes and individual's interpretations in context.....	44
3.3 Mixed-method approaches	45
3.4 Finding empirical evidence and developing educational practice by engaging in design based research	46
4 Aims and methods of the study.....	48
4.1 Aims.....	48
4.2 Subjects	48
4.3 Instructional setting	49
4.4 Research design	51
4.5 Data collection.....	52
4.5.1 Self-report questionnaires.....	52
4.5.2 Process oriented interviews	52
4.5.3 Computer notes.....	53
4.6 An overview of the data analysis.....	53
5 An overview of the empirical studies	55
5.1 Article I Salovaara, H., & Järvelä, S. (2003). Students' strategic actions in computer supported collaborative learning. <i>Learning Environments Research</i> , 6, 267-285.....	55
5.2 Article II Salovaara, H. (2004). An Exploration of Students' Strategy Use in Inquiry-Based Computer Supported Collaborative Learning. <i>Journal of Computer Assisted Learning</i> , 21, 39-52.....	56
5.3 Article III Järvelä, S., & Salovaara, H. (2004). The interplay of motivational goals and cognitive strategies in a new pedagogical culture. <i>European Psychologist</i> , 9, 232-244.....	57
5.4 Article IV Salovaara, H., & Järvelä, S. (2004). Longitudinal analysis of motivational goals and self-regulation – Contrasting self-reports and process-oriented interviews. Submitted for publication.....	58
6 Main findings and general discussion.....	59
6.1 Students' motivation and use of cognitive strategies in dynamic contexts of learning	60
6.1.1 Findings related to cognitive learning strategies in context.....	60
6.1.2 Findings related to achievement goals in context.....	61
6.2 Importance of studying and recognising the interplay of cognition and motivation.....	62
6.3 A longitudinal perspective on motivational and cognitive effects of the pedagogical intervention	63
6.4 Self-regulation in social contexts of learning	64
6.5 Practical implications	65
6.6 Methodological restrictions and implications for further research	66
References	
Original articles	

1 Introduction

The current state of educational psychology and learning research could be characterized as a sequel following the theoretical shift from a constructivist into a socioconstructivist paradigm. The socioconstructivist approach emphasizes that knowing is reciprocally constructed as part of the individual – environment interaction, not objectively defined nor subjectively created. Barab, Hay and Yamagata-Lynch (2001, p. 66) explain the approach by saying that “cognitions are distributed acts that exist in the flow of activity and involve persons interacting in a functional manner over time with other persons and available social, physical and intellectual resources”. Thus, an individual’s thinking is situated in context.

Traditionally, the focus of learning research has been in cognitive aspects of learning, as in the previous citation. Despite this, “whys” have always been of interest to researchers and the concept of motivation had already been introduced by the middle of the 20th century to explain students’ engagement in learning (for a review see Elliot, 1999). Now that learning research has adopted a contextual approach, the “whys” have become more important in understanding learning processes, which are evidenced as being affected by the social and cultural environment. Accordingly, not only have cognitive aspects been investigated from a contextual perspective, but rather recently, motivational aspects as well (e.g., Hickey, 1997; Turner, et al., 2002; Volet & Järvelä, 2001). The change that learning theories have undergone evidently support arguments for contextual interpretations of all learning (cf. Anderman & Anderman, 2000; Pintrich, 2000a, 2003).

The aspiration to understand different aspects of learning evidently requires researchers in the field to develop theoretical models that integrate cognitive, motivational, and social components of learning (Pintrich, 2000a). The attempt to develop models can be seen in the number of studies on self-regulated learning, and the emphasis given to them (e.g., several special issues devoted to self-regulated learning such as Boekaerts, 1999; Boekaerts, Pintrich, & Zeidner, 2000; Perry, 2002; Zimmerman & Schunk, 1989), which try to construe and validate a “one reality perspective on learning”, and gain empirical understanding of how different sub processes of learning interact. The models of self-regulated learning have a high reliance on traditional psychological theories of cognition and motivation, but they are still dynamic in the sense

that they can potentially help us to understand dynamics of learning processes and contextual differences in learning.

The contexts in which modern day learners exist are characterized by technological revolution and rapid, sometimes unstable, change. Hence, it has become more and more important to understand how learners interact with different contexts of learning. It is also crucial to notice that even though it is important to analyze the interaction processes between a learner and contexts of learning, it is not possible to define the exact factors which learning contexts of. Therefore, the dynamic nature of learning contexts becomes highlighted and so the term dynamic is employed in the title of this study.

Since the late 1980s it has become popular to create purpose-oriented learning contexts based on current understanding of learning and to challenge conventional schooling practices. For example, competitive evaluation, emphasis on performing learning tasks, and high teacher authority are replaced with collaborative knowledge construction practices, evolving learning communities, tasks aimed at developing learners' complex skills and competencies, and layered learning activities (e.g., De Corte, Verschaffel, Entwistle, & Van Merriboer, 2003). Technological tools have widely been applied to support developments and approaches such as Computer Supported Collaborative Learning involving pedagogical design, which has become rather common in the field of learning research (Koschmann, 1996; Koschmann, Hall, & Miyake, 2001). Due to the theoretical changes and subsequent pedagogical interventions, which are now being experimented with, the research has moved from isolated experiments and sweeping dispositional studies to authentic and immediate classroom situations. Now the focal question seems to be how learners behave within dynamic contexts of learning and how theories of learning could be adapted so that the person/situation relationship would be given adequate emphasis, both theoretically and empirically.

The aim of this dissertation study is to investigate students' motivational achievement goals and cognitive learning strategies in a learning context which undertakes the current socioconstructivist principles of learning and utilizes collaborative technology to support learning. The focal constructs, motivational achievement goals, and cognitive learning strategies are approached firstly from a theoretical perspective of self-regulated learning, and secondly, from a contextual perspective. Hence, the study is deeply grounded in the ongoing theoretical discussion in the field of learning, self-regulation, and motivation research. It aims to gain understanding of how achievement goals and cognitive strategies function in authentic contexts of learning and to provide research evidence of the interdependence of these two factors in the learning process.

This study consists of two parts. The first part describes the theoretical framework for the study, the methodological background, research design, and finally, the main results and general discussion. The second part consists of four individual articles published by (or submitted to) international peer-reviewed journals. The articles report the body of empirical results from the dissertation study.

2 Theoretical framework

The reason for focusing on two interrelated concepts in this dissertation study, achievement goals and cognitive strategies, stems from the goals set for education in general. As outlined by several researchers, schooling should not focus on transferring domain specific knowledge, but on developing self-regulated learners who are able to purposefully engage in challenging learning tasks in diverse contexts by using self-regulated learning strategies to fulfill self-set goals (Boekaerts, 1999; Paris & Paris, 2001). Hence, it is assumed that learning is a goal directed, deliberate process where cognitive strategies are used to accomplish the goal, and thus both motivational and cognitive elements are required (e.g., Pintrich, 2000b). The motivation for considering achievement goals and cognitive strategies within the framework of self-regulated learning from a contextual perspective originates partly from the changes undergone in learning theory, and partly from the evolved learning contexts, which are designed to implement the learning theoretical principles into educational practices. These changes not only create challenges for individual learners but also urge researchers to experiment with current theoretical models empirically in dynamic contexts of learning.

2.1 Definitions of self-regulated learning

Self-regulated learning has become an important area of research in educational psychology. Many of the core principles of learning generated in research during the last decades can be compressed into a concept of self-regulated learning. It has even been proposed that the theory of self-regulated learning offers a so-called “one reality perspective” for understanding how different elements of learning are related to each other (Boekaerts & Niemivirta, 2000). There is also plenty of empirical evidence indicating self-regulation as a critical factor for students’ learning and achievement (Paris & Paris, 2001; Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992; Zimmerman & Martinez-Pons, 1990). This is not to say that the researchers in the field share a single theoretical model of self-regulated learning comprised of the basic axioms of phases and dimensions of self-regulated learning. Instead, several models of self-regulated learning with different emphasis have been introduced (e.g., Boekaerts & Niemivirta, 2000; Butler & Winne, 1995; Corno 1993; Pintrich & De Groot, 1990; Schunk, 1994; Winne, 1995;

Zimmerman, 2000). Additionally, it should be noted that self-regulatory processes are not limited to learning, but processes of controlling behavior through the “self” are studied in other domains as well (e.g., Kanfer & Ackerman, 2000). The following review focuses on self-regulation of a learning process.

One of the first definitions of self-regulated learning was introduced by Zimmerman and Schunk (1989) who defined it as students’ self-generated thoughts, feelings, and actions oriented toward attainment of their goals. Zimmerman (2000) later broadened the earlier definition as follows: “self-regulation refers to self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals” (p. 14). This broader definition puts more emphasis on the adaptive and modifiable nature of self-regulated actions. According to Winne and Perry (2000), “self-regulated learning constitutes components of metacognition, motivation, and strategic action”. In their definition the voice is given to the basic processes of self-regulation. An even more comprehensive definition is, however, given by Pintrich’s (2000b), who writes that “self-regulation is 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). His definition engages the current theoretical understanding of learning as situated practice by highlighting the impact of context and defining different areas in which self-regulatory processes function. Still, an individual’s processes are considered as the central part of regulation.

As proposed by the conceptual definitions, self-regulated learning constitutes several different sub-processes. Accordingly, different studies on self-regulated learning have stressed different aspects; for example, metacognitive processes (e.g., Winne, 1995), learning strategies (e.g., Paris & Paris, 2001; Weinstein, 1996; Zimmerman & Martinez-Pons, 1986), self-efficacy (Schunk, 1994; Schunk & Zimmerman, 1997; Zimmerman, 1989), motivational regulation (Wolters, 1998, 2003), emotional self-regulation (Pekrun, Goetz, Titz & Perry, 2002) and volition (Corno 1993, 2001). Depending on the studies, there are differences in how self-regulatory processes are portrayed. Despite the slightly different theoretical emphasis in different studies on self-regulated learning, the vast amount of research in the field evidences that the concept of self-regulated learning carries explanatory power by allowing researchers to describe different components of successful learning, relating these components to each other and explaining the dynamics between them, and, finally, relating learning and achievement to an individual’s motivation, cognition, and emotion (Boekaerts, 1999).

Whereas the studies carried out in the 90s focused mainly on cognitive aspects of self-regulated learning (cf. Paris & Paris, 2001), three emerging trends can be seen in recent research: namely the subjectivity/intersubjectivity aspect of self-regulation (e.g., McCaslin & Hickey, 2001), the interest in mapping the relationship between cognitive, motivational and emotional aspects of self-regulation (Pintrich, 2000a), and finally, exploring contextual aspects of self-regulated learning (Perry, 2002). Hence, following the aim of this dissertation study, the subsequent review of self-regulated learning primarily discusses cognitive and motivational aspects of self-regulated learning from a contextual perspective and then examines the interplay of these two concepts.

2.1.1 Achievement goals and cognitive strategies within the framework of self-regulated learning

In his integrative review of self-regulated learning, Pintrich (2000b) introduces the general assumptions of self-regulated learning, which also delineate the theoretical fundamentals of this dissertation because they explain how cognitive and motivational elements jointly function in self-regulated learning. First he stresses, as do many other researchers (e.g., Boekaerts, 1996; Butler & Winne, 1995; Deci & Ryan, 1996; Zimmerman, 1989) that self-regulated learning involves both motivational and cognitive processes. That is to say that these processes work in conjunction with each other. Second, he denotes that self-regulated learning follows the general cognitive perspective by committing to the assumption that learners are active constructors of knowledge and that learning processes can potentially be monitored, controlled, and regulated. By endorsing this view, it is possible to step aside from the fatalistic assumptions of learning and agree that self-regulatory skills can be learned and taught (cf. Paris & Paris, 2001). The third aspect explains the first by presenting a concept, an achievement goal that theoretically binds cognitive and motivational aspects to each other. Goal assumption delineates that self-regulated learning involves the goal, the criterion or standard assumption against which a learner evaluates the process, and, regulates it, if necessary, to meet the standards. Goals are often approached as motivational constructs, thus supported by achievement goal theory (Ames, 1992), but also as cognitive representations of what learners are trying to attain (e.g., Winne & Hadwin, 1998). To meet the standards set in the goal setting phase, learners apply different kinds of cognitive regulation attempts, such as cognitive learning strategies. Fourth, Pintrich (2000b) denotes that self-regulatory activities are mediators between personal and contextual characteristics and actual performance. By committing to this assumption, it is possible to abandon those views of self-regulated learning which assume that self-regulated learning constitutes a general, transferable set of learning skills or knowledge and attitude promoting higher level learning which can be transferred from one learning situation to another (cf. Boekaerts, 1999). Instead, following the recent development of learning theory, there are reasons to commit to those definitions of self-regulated learning which take into account contextual dimensions of learning.

Taken together, motivational constructs are needed in the framework of self-regulated learning to understand why students do or do not engage in learning and to understand how engagement is maintained throughout the learning process (Boekaerts & Niemivirta, 2000; Wolters, 2003). Accordingly, cognitive constructs are needed to understand how students implement their goals or aspirations.

In addition to outlining the four previously mentioned cornerstones of self-regulated learning, Pintrich (2000b) presents a sequenced model of the phases of self-regulated learning. The sequenced model helps to clarify how the sub processes involved in self-regulation mutually influence each other and function in different phases of a learning process and how their influence fluctuates along the learning process. The model includes four areas in which self-regulatory activities occur: cognition, motivation, behavior and context. It has been applied as a theoretical framework in empirical studies concerning the interaction of motivational and cognitive processes in self-regulated learning (eg.

Azevedo, Cromley & Seibert, 2004). The sequenced model begins with goal setting, which is an integral part of the first phase of self-regulation involving forethought, planning, and activation (also Paris & Paris, 2001; Schunk, 2001; Zimmerman, 2000). Even if achievement goals are generally considered to be motivational constructs, they not only represent learners' motivational orientation but are also seen to direct the selection of the further cognitive attempts. The motivational role of goals is highlighted in the model, but it should be noted that the general orientation of the learning task is shaped by the mutual interaction of students' goals, epistemological beliefs, task context, and classroom environment (Pintrich, Marx & Boyle, 1993). Boekaerts and Niemivirta (2000) argue that goal related identification, interpretation, and appraisal processes are the gateways to self-regulation and that all of these sub processes are effected by both individual and contextual factors.

Coming back to Pintrich's model, cognitive strategies mainly function in control phases, which follow the first phase involving goal setting and the second phase involving monitoring. Generally, by selecting appropriate cognitive strategies, learners try to realize their selected goals of the learning task. More specifically, the cognitive area of self-regulation begins with cognitive goal setting, prior knowledge activation, and planning, continues with metacognitive activities and cognitive regulation, and finishes with final cognitive judgments and attributions. Pintrich (2000b) places the actual use of cognitive strategies in the phase of cognitive control and regulation, after the phases of cognitive planning and activation and cognitive monitoring. However, it should be noted that the phases of motivational goal setting and cognitive regulation can go on simultaneously and dynamically as the goals and plans are changed and updated based on the feedback from the monitoring, control, and reaction processes with which learners engage. Other researchers highlight this feedback system as well (e.g., Winne, 1995; Boekaerts & Niemivirta, 2000). Considering the contextual aspects of self-regulation, the feedback system explains the interaction processes between an individual learner and the learning context.

The final phase of the sequenced model of self-regulated learning is reaction and reflection. From a cognitive point of view it involves cognitive judgments and attributions and from a motivational point of view affective reactions and motivational attributions. Pintrich's model provides rough frames for understanding how different sub processes function in the self-regulated learning process. It should be noted, however, that the phases introduced in the model are not necessarily sequential or even possible to separate from one another (Pintrich, 2000b). Rather, learners may move forward and backward through the phases, or the processes of different phases may be going on simultaneously.

2.1.2 The role of context in self-regulated learning

The ongoing discussion of whether self-regulation should be considered as trait or state can be seen in theoretical models of self-regulated learning and particularly in how the role of context has been acknowledged in them. The strict trait perspective on self-regulated learning, represented by such researchers as Kanfer and Ackerman (1996), has

been challenged by rather consistent empirical evidence concerning the role of context in self-regulated learning (e.g., Alexander, 1995). Now the important question is how context should be conceptualized, and how these new conceptualizations should be taken into account empirically. As pointed out by Meyer and Turner (2002), constructivist and sociocultural views offer different definitions of context.

The constructivist perspective on self-regulated learning offers both theoretical explanations and empirical evidence of how context affects learners' self-regulation. Context is seen as a variable which has an effect on an individual's processes. Pintrich's (2000b) model, reviewed in preceding sections, can be viewed as a constructivist model since context is considered to be one of the four areas of regulation. He suggests that the context area of self-regulation involves individual perceptions of the task and context, the monitoring the task and contextual features of classroom, efforts to control and regulate the task and context, and, finally, general evaluations of the task context and classroom environment. Hence, context is considered to be overarching during the different phases of self-regulation. In Winne's and Hadwin's (1998) model the role of context has been taken into account in a feedback loop model where so-called task conditions contribute to the perceptions which the learner generates about the task at hand. These perceptions contribute to how the learner engages in self-regulated learning. Boekaerts and Niemivirta (2000) acknowledge that self-regulation takes place in learning episodes in which a learner displays context-specific and goal directed learning behavior. Hence, they assume that context functions as an invoking factor which generates self-regulated learning in coincidence with contextual cues and personal aspirations. In Zimmerman's model of self-regulation the focus is self-regulating individuals who are "participating metacognitively, motivationally and behaviorally in their own learning processes" (1989, p. 4) and the (social) context is considered the origin of individual self-regulatory skills which develop through modeling, social guidance, and feedback (Shunk & Zimmerman, 1997). Thus, context is seen as a separate variable affecting an individual's self-regulatory skills, but an individual's self-regulatory competence also develops through social modeling experiences. All of these models imply that contexts can affect self-regulation processes not only directly by setting up constraints and possibilities for taking action, but also through affecting learners perceptions. Shunk (1995), for example, points out that learners' perceptions of themselves, others, and learning environments affect their self-regulatory efforts. Another question is to what extent these perceptions are driven by trait or personal dispositions and to what extent by contextual effects.

Empirical studies, following the constructivist perspective of context, provide information on how different variables interact with each other in self-regulated learning. Pintrich and Roeser (1994), for example, studied classroom and individual differences in motivation and self-regulated learning and found that both student entry characteristics and between- and within-classroom characteristics, such as offering task choice and interesting tasks and possibilities for peer collaboration, had a positive influence on students' self-regulated learning. Purdie, Hattie and Douglas (1996) found cultural differences between Japanese and Australian students in students' conceptions of learning and indicated that these differences were also associated with the students' use of self-regulated learning strategies. Hence, the impact of context can be seen in various levels ranging from classroom specific features to cultural differences.

The theoretical models of self-regulated learning, based on constructivist assumptions, however, show context and individual as separable entities (cf. Meyer & Turner, 2002). Even though the role of context is recognized in all of the previously mentioned models, only Zimmerman's approach is related to the recent sociocultural discussion as it refers to learning of self-regulatory skills as an enculturation process. Notwithstanding, the model neglects the issue of the person – social environment relationship, which will not disappear after an individual has internalized self-regulatory processes and become a “self-regulated learner”. The interconnected relationship between social environment and individual is a key assumption of sociocultural theories, which considered it from a more pervasive perspective. McCaslin and Hickey (2001), for example, highlight the social environment by saying that the ultimate goal of instruction is not the internalization of self-regulatory skills, but that self-regulation is instrumental to socially meaningful activities that feed the culture the individual is participating in. This view stems from the Vygotskian perspective on the individual – social relationship, and introduces a new concept concerning regulation as an interpersonal process: co-regulation (McCaslin & Good, 1996). Co-regulation is seen as a facilitator of individual self-regulation, but basically these processes are seen as complementary to each other (Hickey & McCaslin, 2001; McCaslin & Hickey, 2001). A study by Vauras, Iiskala, Kajamies, Kinnunen and Lehtinen (2003) explored the social nature of regulation processes and introduced the term “shared regulation”. Their focus was on metacognitive aspects of regulatory processes and according to their results, peer interaction can involve regulatory elements that support students' cognitive efforts. It should be noted, however, that the empirical work regarding social aspects of self-regulation processes is, so far, sparse (cf. Meyer & Turner, 2002).

Despite the degree of which the social aspect is taken into account theoretically, the initiative concerning the influence of context on self-regulation has opened the way to studies in which self-regulation is investigated in authentic classroom situations (e.g., Perry, 2002). Following this rather conciliatory line, Butler (2002) suggests a revised definition by saying that self-regulated learning has the potential to occur when students are motivated to reflectively and strategically engage in learning activities within learning situations that foster self-regulation. The constructivist line of self-regulated learning has generated a vast amount of empirical evidence by indicating that context does matter in learning, and hence provides a strong basis for further research. On the contrary, if the novel conceptualizations offered by sociocultural perspective are coupled with further methodological development, they have the potential to enrich the discussion by making new openings in the field.

2.2 Cognitive learning strategies

As pointed out previously, strategic activity is an essential part of any self-regulatory system in which cognitive, metacognitive and motivational factors jointly function (Pintrich & De Groot, 1990; Weinstein, Husman & Dierking, 2000; Winne 1995, 1997; Zimmerman, 1994). Within the framework of self-regulated learning, cognitive learning strategies function in the area of cognitive regulation (cf. Pintrich, 2000b). Cognitive self-

regulation includes other cognitive processes as well, metacognition, for example. But cognitive learning strategies still play a major role by providing the means for a learner to regulate cognitive efforts. Research on cognitive strategies has demonstrated important linkages between cognitive learning strategies and academic performance (Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Weinstein & Mayer, 1986, Zimmerman & Martinez-Pons, 1986). Hence, researchers have been interested in finding out how the use of cognitive strategies contributes to performance. Effective, appropriate, and independent strategy use has been seen as a characteristic of a skillful learner. Furthermore its use leads to higher academic achievement (Paris, Byrnes & Paris, 2001; Zimmerman & Martinez-Pons, 1986). However, particularly among researchers committed to the self-regulation perspective on learning, it has been highlighted that not only do learners need to know how, when, and what strategies to apply, but also need to be motivated to use strategies. The next section focuses on reviewing strategy research, particularly how it has been investigated in relation to self-regulation.

2.2.1 Definitions of cognitive learning strategies

The term cognitive strategy refers to learners' cognitive actions that are performed in order to attain a particular learning goal or to accomplish a learning task at hand (Mayer, 1988; Paris et al., 2001; Schneider & Weinert, 1990). Some researchers also emphasize that cognitive strategies are deliberately generated by the person and involve both agency and control rather than mindless rule following (e.g., Paris et al., 2001; Paris, Lipson & Wixton, 1983; Wade, Trathen & Schraw, 1990). Hence, in the best possible situation, cognitive learning strategies are intentionally selected according to the demands of the task at hand, and they involve both cognitive skill and motivational will. Hadwin and Winne (1996) explain the intentionality issue by making a connection between goals and strategy use. They denote that "the term strategy use refers to occasions when students define their own short-term goals and overall goals for studying and select and coordinate alternative study tactics they expect will be helpful in achieving those goals." Strategies may, however, be applied unintentionally, but learners can potentially become aware of using them (Schneider & Weinert, 1990). Furthermore, strategies have the potential to become automatic and transferred into different learning situations although they are applied as a consequence of recognition of the cognitive demands of the learning task at hand.

In order to use strategies in a meaningful way students are required to have declarative knowledge (knowing a variety of strategies), procedural knowledge (knowing how to apply different strategies) and conditional knowledge (knowing when to use a particular strategy) of strategies (Butler & Winne, 1995; Paris et al., 1983; Weinstein et al., 2000). In a problem-solving situation, for example, this would mean that the learner knows a variety of different problem solving strategies, knows how to apply them to the situation at hand, and, finally, is able to evaluate which would be most suitable for solving the problem. Hence, procedural strategic knowledge does not necessarily engender conditional strategic knowledge (Pressley, 1995). These components of strategic knowledge were the hallmarks of strategy training, which was particularly popular in the

1980s (Pressley, Harris, & Marks, 1992). Furthermore, they demonstrate the multidimensional nature of strategic knowledge.

Students can differ from each other in strategy use in a number of ways: the quality of strategies they apply, how often they use strategies in their learning, whether they use them consistently, or to what degree their strategy use is conscious, in other words, whether they can state a purpose for using each strategy (Wade et al., 1990). In addition to assuming that students may possess strategic skills, it should be noted that learning contexts set up requirements, possibilities and challenges for applying certain cognitive strategies. In the 1970s strategies were even situated in specific disciplines such as reading and mathematics as the researchers recognized that each of these disciplines provided different frameworks for cognitive activity (Alexander, 1995). Cognitive strategies have been investigated in contexts of writing, for example (e.g., Graham & Harris, 1994; Harris & Graham, 1996; Scardamalia & Bereiter, 1986), reading (e.g., Goldman, 1997; Paris et al., 1983; Paris, Wasik & Turner, 1991; Pressley & Afflerbach, 1995), mathematical problem solving (Schoenfeld, 1992), and complex problem solving (Chi, Bassok, Reimann & Glaser, 1989).

Although the strategy research, carried out within different disciplines and related to specific learning processes has yielded an extensive amount of information on cognitive learning strategies, it is reasonable to suppose that more general and comprehensive approaches are also needed. The recent theoretical changes have resulted in open-ended learning practices and contents crossing several disciplines which require students to engage different cognitive processes and use several cognitive strategies simultaneously. In addition, there is a clear focus on the individual learner in the conceptualizations of cognitive learning strategies, but the linkages to social dimensions of learning are scarcely considered (cf. Paris & Paris, 2001). These two aspects, multiplicity of strategic processes and social dimension of learning, create challenges for current research on cognitive learning strategies.

2.2.2 Scope of cognitive learning strategies

Some researchers differentiate study tactics from learning strategies by defining strategy as consisting of an array of specific tactics (Derry & Murphy, 1986; Howard-Rose & Winne, 1993). Thus, a study tactic is a specific, individual study technique such as underlining, notetaking, outlining, summarizing, visualizing, or using mnemonics. Strategy, on the other hand, is a composition of these more specific tactics. Corno and Mandinach (1983) made this kind of distinction by introducing two general types of cognitive strategies, transformation and acquisition, consisting of smaller-grained components such as attending, rehearsing, monitoring, selecting, and connecting. However, when Howard-Rose and Winne (1993) sought to validate this model empirically, they were unable to classify small-grained components as belonging to more general components of cognitive strategies. This attempt demonstrates that although it is possible to make this kind of distinction conceptually, it is difficult to find the exact difference between a tactic and a strategy and to define when a strategy actually consists of several interconnected actions, or a single but more extensive strategic action.

In their review of research on cognitive strategies, Paris and Paris (2001) argue that one of the characterizing features in the development of strategy research has been the growth of grain size. This means that the focus has shifted from investigating single strategies related to specific types of cognitive activity, such as summarizing text, to focusing on more comprehensive strategies. This is also related to the discussion of strategies and tactics and advocates that the focus should be on strategies with a larger grain size rather than on single cognitive operations, which tactics would represent. Additionally, more emphasis has been put on understanding how learners use cognitive strategies in real classroom situations and this focus entails approaching strategies of a larger grain size (Paris & Paris, 2001, Turner, 1995).

In the current study, no conceptual distinction is made between a single cognitive operation, which could be called a tactic, and a more comprehensive cognitive strategy perhaps consisting of several intertwined tactics. The general conceptualization of cognitive strategies is applied to refer to both types of cognitive activity. Notwithstanding, it is important to note that different strategies may have a different magnitude, scope, and importance.

2.2.3 Variety of cognitive learning strategies

An extensive amount of information on different types of cognitive learning strategies has been generated during the last few decades. It has been shown that there are both mental strategies, such as creating mental models of what is being read, and external strategies, such as note taking (Paris et al., 2001). As pointed out previously, some strategies are task or even discipline specific whereas others can be general heuristics. One of the most cited categorizations, introduced by Weinstein and Mayer (1986), differentiates between rehearsal, elaboration, organizational, metacognitive, and affective strategies. *Rehearsal strategies* are generally associated with repetition, which aim to reproduce the material in some form. Rehearsal strategies could be activities such as creating acronyms, underlining information, or copying material. *Elaboration strategies* involve processes by which the learner tries to make the content more comprehensible, or attaches the new information into a personally meaningful context. Elaboration involves strategies such as summarizing information or relating new information to existing knowledge. *Organizational strategies* entail processes such as grouping information, organizing information into meaningful categories, and outlining a concept map. *Metacognitive strategies* are related to monitoring and managing one's own cognitive processes (also Alexander, Schallert & Hare, 1991; Garner & Alexander, 1989). They may include, for instance, checking comprehension, self-questioning, evaluating the learning process, and monitoring the use of cognitive strategies. *Affective strategies* aim at affecting one's own internal states, such as preventing external disturbance or using thought stopping to keep the learning process focused. Although this categorization provides a general framework for the scope of strategies, it does not suggest any particular strategy to be superior.

Different types of learning strategies are often distinguished from each other by the well-known distinction between deep processing and surface processing strategies

(Entwistle, 1988). *Deeper level strategies* involve processes such as retrieving concepts and ideas relevant to the current learning task, monitoring relationships between new knowledge and prior knowledge structures, elaboration, transforming information into meaningful schemata and critical thinking (e.g., Elliot, McGregor & Gable, 1999; Hadwin & Winne, 1996). *Surface level strategies* involve memorisation, rehearsal, and rote learning (e.g., Elliot et al., 1999). This categorization has been applied in some rather well known research instruments such as in Motivated Strategies for Learning Questionnaire (MSLQ by Pintrich, Smith, Garcia, & McKeachie, 1993) and in several empirical studies concerning strategy use and its relation to achievement, other learning processes, and motivation. Furthermore, Entwistle's categorization has been used as a model that puts strategies into an order of superiority, deeper level strategies representing a more advanced type of strategy use and surface level strategies representing less advanced type of strategy use.

A third categorization has been provided by Scardamalia and Bereiter (1993) who have distinguished two main types of strategies: *knowledge reproduction strategies*, which are procedural strategies that students typically employ in completing procedural school tasks, and *knowledge building strategies*, which, in contrast, promote understanding, students' active contributions of knowledge, and progressive discourse on the subject studied. The other categorizations do not consider the social aspect of learning processes in detail and, hence, the strength of Scardamalia's and Bereiter's categorization is that it includes the assumption that cognitive processes can be social instead of the assumption that cognitive processes are solely individual by nature.

The research findings support the idea that deeper level cognitive strategies, especially those that are related to solving problems and developing understanding, are essential in academic learning (e.g., Pintrich & De Groot, 1990; Pintrich, Brown & Weinstein, 1990; Pressley & McCormick, 1995). Strategies associated with transformative behaviour, such as organising, elaboration, goal setting and planning have been found to be associated with using meaningful approaches in problem-solving situations (Pape & Wang, 2003). The same study reported that high achieving students reported using more strategies and more different types of strategies. However, despite the rather widely accepted assumption that deeper level strategy use would be related to higher academic outcome, it should be noted that not all studies agree with these findings. Wade et al. (1990), for example, found no correlation between particular types of strategies and learning outcomes.

The reason for the inconsistencies in the findings may be both theoretical and methodological in nature. The classifications of strategies are useful for understanding different dimensions of cognitive strategies, but it should be noted that they may lack the accuracy or sensitivity needed in differentiating between and conceiving of the specific characteristics of the learning process within diverse contexts (cf. Lewalter, 2003). Furthermore, since most learning tasks require the use of several different types of learning strategies, as pointed out by Purdie et al. (1996), the dichotomizations between favorable and unfavorable strategies does not necessarily explain the full nature of strategic activity. For example, rote learning, which is generally seen as an unfavorable strategy, can, in certain conditions, lead to understanding; or some problem solving tasks can involve phases in which surface level processing is needed in order to generate an adequate solution.

2.2.4 Cognitive strategies in learning context

The contextual nature of cognitive strategies has been highlighted in strategy research. Accordingly, cognitive skill as a trait and cognitive strategy use as an individuals' disposition have been strongly questioned both theoretically and empirically. It is recognized that the types of strategies that learners use are highly dependent on contextual factors such as the quality of instructional tasks and embedded learning goals (Pintrich & Garcia, 1991). For instance, students use different strategies based on whether they read for learning, complete an essay, or study for an exam (Hadwin, Winne, Stockley, Nesbit, & Woszczyna, 2001). The discussion has, however, been focused on the transferability of strategic skills from one learning context to another. It is assumed that skilful use of cognitive learning strategies involves shifting smoothly between different types of strategies and applying different strategies flexibly according to the demands of the task (Corno & Mandinach, 1983). Conditions for learning new strategic skills have also been of interest to researchers. It has been shown, for example, that it takes time to adopt a newly learned strategy because a new strategy requires more effort to carry out than a familiar routine and old strategies are more easily accessible for different tasks (Pressley, 1995). Hence, learners may face difficulties when trying to adapt a newly learned strategy to differing circumstances or unfamiliar context (Pressley et al., 1992). Lewalter (2003), for example, studied students' use of cognitive strategies when using dynamic visuals. She found out that although the learning environment with dynamic visuals supported comprehension and problem solving, students' strategy use was undeveloped and that hindered effective learning. Students used rehearsal strategies quite often in more conventional school tasks, but only rarely the elaboration and control strategies required for the new learning task.

The discussion concerning transferability of strategic skills has been particularly lively within studies involving strategy interventions. Despite the popularity of strategy interventions where learners are taught strategic skills, their usefulness has been debated (Hadwin & Winne, 1996). It has been suggested that strategy instruction should be integrated into a larger framework of self-regulated learning involving the helping of students to identify their goals in a learning task. As Butler (2002) argues, contextualized strategy interventions can be more effective than teaching general strategic skills. By contextualized strategy interventions it is easier to demonstrate the different types of strategic knowledge (procedural, declarative, and conditional) that are essential for fostering students' self-regulated strategy use.

The results by Many, Fyfe, Lewis and Mitchell (1996) suggest that the relationship between strategy use and context might be reciprocal. Their study indicated that students' task impressions, the materials they used and the cognitive learning strategies that students applied to the task were influenced by one another. Furthermore, their results indicated that transactions between these factors were also affected across time and through social interactions (formal and informal messages) that students engaged in. The impact of contextual conditions in which learning occurs had already been recognized by Weinstein and Mayer in 1986, when they denoted that strategies are affected by other factors in addition to the characteristics of learning tasks and materials. They suggested that school practices cultivate certain types of strategies for reading, writing, computing,

studying, and taking tests. Empirical evidence on this issue is, however, rather recent. Ryan and Patrick (2001) indicated that classroom social environment has an effect on students' cognitive self-regulation. Promoting interaction among students, teacher support for students, mutual respect, and teacher encouragement promoted cognitive self-regulation and even maintained it through middle school. Students' culturally built conceptions of learning are related to strategy use. In their comparison between Japanese and Australian students, Purdie et al. (1996) found that the students' conceptions of learning as understanding were associated with a greater total use of strategies, but not with the quality of the strategies used.

Teachers' behavior plays an important role in developing and enhancing students' cognitive learning strategy use. Teachers communicate goal messages that influence students' choice between different strategies by affecting students' adoption of learning goals. Students' strategic activity is also related to teachers' coaching of learning and particularly to practices by which teachers model the use of strategies and urge students to apply them in different situations (Hamman, Berthelot, Saia, & Crowley, 2000). The different elements of learning context that may potentially have an effect on students' motivation and cognitive self-regulation will be further discussed in Chapter 2.5.1.

To conclude, the use of cognitive learning strategies is affected both by the learners' own skills, preferences, intentions and interpretations; and the learning context consisting of several elements such as task requirements, social environment, and tools available in the situation. It is important to notice that these elements do not produce strategic activity in an additive manner. Rather, they interact in several ways, mutually constitute each other, and thereby produce a unique set cognitive learning strategies that is applied in the learning task at hand.

2.3 Achievement goal perspective on motivation

The role of goals has been referred to in the preceding sections from a cognitive perspective and as a concept functioning in conjunction with motivation and cognition. The concept of a goal is, however, emphatically a motivational construct. Many motivation researchers strive to better understand learners' achievement behavior. To realize a better understanding, it has been suggested that the goals which individuals pursue and value should be considered (Dweck, 1986; Nicholls, 1984). Achievement goals function as a framework within which individuals interpret and react to events, and hence, constitute reasons for learning behavior (Dweck & Leggett, 1988). Motivational achievement goal theory, postulating that certain types of goals lead to certain types of behavioral patterns, has been at the heart of recent motivation research (cf. Pintrich, 2003). One of the topical and important questions in the field concerns the role of context in motivation. It underlies the importance of studying questions about the relationship between an individual and context, the dispositional and contextual perspectives of goals, and the possibility of engaging in multiple goals at the same time.

2.3.1 Different levels of goals

Achievement goals can be generally defined as integrated patterns of students' beliefs concerning their reasons for engaging themselves in a learning task (Pintrich & Schunk, 1996). Hence, goals create a framework for individuals' interpretations and experiences in an achievement setting (cf. Elliot, 1999). Goals, however, can be task-specific goals or more general goal orientations (Pintrich, 2000b; Pintrich & Garcia 1994; Pintrich & Schunk, 1996). By definition task-specific achievement goals represent the specific outcome that the individual attempts to accomplish (Elliot, 1997). Goal orientations reflect the more general reasons for an individual to engage in a learning task. Hence, goal orientation is most often used to illustrate the general, trait-like, yet dynamic, motivational disposition (e.g., Seegers & Boekaerts, 1993), and can be regarded as cutting across domains (cf. Silva & Nicholls, 1993). In contrast, task-specific achievement goals are influenced both students' goal orientations and partly by situational characteristics.

According to Boekaerts (2001), students' goal setting is influenced both by general goal orientation and situation-specific motivation. Hence, to cover the relationship between an individual student's motivational disposition and contextual interpretations within a specific learning situation, it is necessary to identify the multiple levels in which motivation is construed. Particularly the so-called social cognitive theories of motivation (cf. Dweck & Leggett, 1988) and the latest theoretical models as proponents of them highlight the meaning of individuals' interpretations of the contextual goals (e.g., Järvelä & Niemivirta, 2001; Linnenbrink & Pintrich, 2001; Urdan & Midgley, 2003). According to Higgins (1990), the assignment of subjective meaning for goals involves integration of current informational input with relevant prior knowledge.

The relationship between goal orientation and task-specific goals is reciprocal. In other words, task-specific goals are at least partly invoked by the individual's goal orientation, and goal orientation can influence different learning processes because it is more of a general framework than a task-specific goal (Meece, 1991). It should also be noted that task-specific goals might generate outcomes, which furthermore, affect goals at the orientation level. However, the mechanisms of these kinds of interaction processes have not been investigated to a great depth.

Although the current study focuses on achievement goals, it should be noted that motivational goals could include other elements in addition to achievement and cognitive ones. Considering the social-cognitive framework of the current study, namely the prolific body of research on social goals becomes relevant. Social dimension of motivational goals has been discussed and studied by several researchers and different concepts have been used to define the dimensions of social goals. For example, Dowson and McInerney (2003) have introduced social goals constituting of factors such as social affiliation, social responsibility, and social concern. Vauras, Salonen, Lehtinen, and Lepola (2001) have discussed the social dimension of goal orientation, particularly in relation to children's social dependence and ego-defensive behavior. According to Patrick, Anderman and Ryan (2002) students can pursue social goals such as responsibility, intimacy or relationship and status goals. Although the research evidence on how social goals interact with achievement goals is yet fragmentary, the social

dimension of goals is particularly important when the contextual nature of students' motivation is addressed and goals are not illuminated as exclusively intra-individual dispositions.

The achievement goal orientation view on goals has generated a substantial body of research in the field. Goal orientations leading to certain kinds of learning behaviours are doubtlessly important in providing some kind of predictions on how individuals will engage in learning tasks and, thus, have a great deal of explanatory power. However, there is a need for studies which do not neglect the meaning of individual learners' contextual goal interpretations, as knowledge of how general level orientations are realized in contextual goal processes is paramount to understand learning processes in detail.

2.3.2 Adoption of goals

If we want to understand what factors influence students' goals, we need to understand how goals are construed. Boekaerts and Niemivirta (2000) present an in-depth description of how achievement goals are construed within context. They suggest that goals are affected both by students' task-focused (cognitive) and self-focused (motivational and emotional) interpretations of a learning task context. They review how different researchers view the self as a focal component in goal setting and goal striving. According to this perspective, goals are representative of an individuals' desired self. Kruglanski's (1996) conceptualization of goals views them as knowledge structures representing future end states.

Boekaerts and Niemivirta (2000) explain how individuals interpret learning situations in the contextual goal setting phase and review two conceptually separable processes: interpretation and appraisal process. Following Higgins (1990), interpretation involves assignment of personal meaning to an event and, according to Lazarus and Smith (1988), the appraisal process consists of evaluating the personal significance of the situation. Appraisal can also be seen as a mediator between a situation and its following behavior. Considering goals, this means that before adopting a task-specific goal, learners interpret and evaluate the situation at hand in light of their personal preferences, illuminated by dispositional characteristics such as goal orientations. The goal setting phase is followed by a goal striving phase (sometimes referred to as volitional control, e.g., Corno, 1993) that involves moment-to-moment motivational thoughts (Ames & Ames, 1989; Boekaerts & Niemivirta, 2000). Taken together, both general level goal orientation and moment-to-moment interpretations are part in the process whereby contextual goal interpretations are construed. Even though there exist theoretical explanations of how this process comes about, there is need for further information concerning the critical contextual elements involved in goal setting and the interaction of context and individual learner.

2.3.3 *Achievement goal theory*

Achievement goal theory is driven by an assumption that there are qualitative differences in the motivational goals that learners endorse. The qualitative distinction between different types of goals is thus important as goals are seen to have linkages to achievement behavior. Most achievement goal theorists have defined two distinct types of goals. Dweck (1986) contrasts performance and learning goals, Nicholls (1984) contrasts ego involved and task involved goals and Ames and Archer (1988) contrasts performance and mastery goals. Essentially, these differentiations are considered to be conceptually similar enough to classify two basic types of goals: mastery (equivalent to task involved and learning goals) and performance goals (equivalent to ego involved goals).

Mastery goals refer to appreciation of the learning task at hand and to learners' endeavours to master the learning task, understand, and increase one's competency (Ames, 1992; Covington, 2000; Dweck, 1986). Theoretical models of goal orientation propose that mastery goals produce adaptive learning patterns (Ames, 1992; Dweck, 1986; Dweck & Leggett, 1988). The research has indicated that students pursuing mastery goals reveal higher levels of task value, efficacy (Ames & Archer, 1988), and interest (Harackiewicz, Barron, Tauer & Elliot, 2002). They are also cognitively more engaged by using metacognitive and cognitive strategies (Meece, Blumenfeld, & Hoyle, 1988; Pintrich & De Groot, 1990), seeking challenge (Elliot & Dweck, 1988), demonstrating persistence (Elliot et al., 1999), and showing lower levels of anxiety (Ames, 1992). Furthermore, it has been shown that mastery goals are associated with specific means-end beliefs (Dweck, 1986; Niemivirta, 1998). These adaptive behavioural patterns are also predictors of success in academic tasks, and, consequently some studies have reported that mastery goals predict high academic achievement (e.g., Ames & Archer, 1988). However, the research evidence concerning mastery goals as a predictor of high academic achievement is inconsistent (c.f. Wolters, 2004).

Performance goals involve the wish to outperform others, increase one's status and surpass normative standards (Ames, 1992; Pintrich & Schunk, 1996). Thus, the focus is on normative performance, not on appreciation for what is being learned. The results concerning performance goals do not show as consistent a relationship between performance orientation and behavioural patterns as the results concerning mastery goals do (cf. Harackiewicz, Barron & Elliot, 1998). In general, performance goals have been associated with maladaptive learning patterns including the use of superficial learning strategies (Meece et al., 1988), avoidance of taking on challenging learning tasks (Dweck & Leggett, 1988), and anxiety following failure (Jagacinski & Nicholls, 1987). There is also evidence that performance goals are connected with ability-related beliefs (Dweck, 1986; Niemivirta, 1998) However, there are inconsistent findings regarding learning strategies (Bouffard, Boisvert, Vezeau, & Larouche, 1995), and the research has not provided clear patterns of relationships between performance goals and persistence or effort (cf. Covington, 2000).

One reason for these vague findings may be the lack of conceptual consistency in performance goals. As Elliot (1999) puts it, some of the goal theorists have abandoned the avoidance aspect in proposing the basic concepts of achievement motivation, and

treated performance goals as omnibus constructs which embody both approach and avoidance dimensions. In his review of achievement goal theory, Elliot (1999) argues that there is a strong basis for including the avoidance dimension in achievement goal theory, and particularly to the performance goal construct. It has been suggested that performance goal theory should include more distinct elements related to task approach as well as to task avoidance (Harackiewicz et al., 1998; Pintrich, 2000c).

Recently, researchers have proposed a so-called revised goal theory consisting of mastery goals and two types of performance goals, namely performance-approach goals and performance-avoidance goals (Harackiewicz, Barron, Pintrich, Elliot & Thrash, 2002; Midgley, Kaplan & Middleton, 2001). According to the Harackiewicz et al. (2002) studies, performance-approach goals, which focus on attaining normative competence, are adaptive and predict high grades in academic tasks. Accordingly, performance-avoidance goals, in which the focus is on avoiding unfavourable normative competence, have been shown to have deleterious consequences for interest and performance (Elliot & Harackiewicz, 1996). In Pintrich's (2000c) revised goal model, approach and avoidance dimensions are attached to both performance and mastery goals, in order to provide a two-by-two allocation that includes a mastery-avoidance dimension. According to Elliot (1999, p. 181), "mastery-avoidance goals are focused on avoiding self-referential or task-referential incompetence". Hence, a learner with such a goal would strive for developing competence without concern of task outcomes outside of individual competence. The revised achievement goal theory has, however, been criticized because of the incomplete empirical evidence. The positive effects of approach-performance goals have been demonstrated in achievement settings, which endorse outperforming, such as university classes (e.g., Kaplan & Middleton, 2002). Experimenting with the theory in a non-conventional learning context might provide further clarification of the effects of different types of achievement goals.

Although several researchers have outlined the importance of the avoidance dimension (for a review see Elliot, 1999), there are only a few studies examining *avoidance goals* as a stand-alone variable (Linnenbrink & Pintrich, 2001; Niemivirta, 2002). There are, however, a few examples of studies in which avoidance goals have been theorized and studied as a separate construct (e.g., Järvelä & Niemivirta, 2001, Meece et al., 1988; Nicholls, Patashnick & Nolen, 1985; Nolen, 1988; Urdan, 1997). Not only have these studies investigated work-avoidant goals referring to an individual's wish to get the work done as quickly as possible and with minimal effort, but they have also demonstrated that avoidance goals are negatively correlated with a mastery orientation (Meece et al., 1988; Nicholls, Cheung, Lauer & Patashnick, 1989). The revised goal theory approaches the avoidance dimension by a combined concept of performance-avoidance goals, in which the focus is on avoiding faultfinding judgements in terms of normative achievement (Harackiewicz et al., 2002). One reason for attaching avoidance into other goal constructs is that avoidance, as a stand-alone construct, is not an achievement goal because it is not specifically about competence (Elliot, 1999). Nevertheless, it might be that avoiding a learning task might be about competence if a student is stepping aside from the learning task in order to avoid judgements about his or her academic competence. Another possibility is that learning is seen as a means to an end (cf. Nicholls, 1983). By treating avoidance goals as a separate goal type it is likely that it accounts both for those students who want to avoid unfavourable judgements, and, more importantly, for those students

who wish to get the work done with minimal effort or who want to stand completely aside in learning situations (cf. Middleton & Midgley, 1997; Nolen, 1988). These kinds of wishes are play major role in learners' achievement behaviour and have most likely consequences for academic performance. In school learning situations the classroom motivational structures are highly dynamic, varying from competitive achievement situations to pedagogical practices in which the goal of the activity is to push students to master and understand what they are trying to study. Accordingly, treating the avoidance dimension of motivation as integrated with performance-avoidance goals might lack explanatory power in situations where the classroom goal structure does not emphasize performance. Following the early studies on motivational orientations (e.g., Nicholls, 1983; Nolen, 1988), in the current study, avoidance goals are studied separately from performance and mastery goals. The avoidance is treated as a construct depicting work avoidance and desire to invest as little effort as possible.

It is evident that a dichotomous categorization of goals does not illuminate the whole scope of achievement motivation. Accordingly, the revision of goal theory is still under development and discussion. There have been also other related attempts to complement the understanding of achievement goals. For instance a multiple goals perspective arguing that learners could strive for mastery and performance goals in their school work at the same time has been discussed and studied (e.g., DeGroot, 2002; Pintrich, 2000c). It has been argued that sometimes these simultaneous goals may even be conflicting (Boekaerts, 1999). Furthermore, it has been shown that goals can differ from each other by their difficulty and specificity (Kanfer & Ackerman, 1996). Even though achievement goal theory would delineate student behaviour through orientation level, context specific goal interpretation, appraisal and striving create challenges for research. Thus, the behavioural patterns nominated by achievement goal theory can be affected by altering external conditions of an achievement situation. This has been illustrated for instance in experimental studies where different achievement aims are assigned to students. Kanfer and Ackerman (1989), for example, indicated that when subjects were given a specific, highly challenging goal (attaining the 90th percentile or above) they performed better than those students who were told to "do their best". Considering achievement goals involving learners' reasons for engaging academic tasks, their interpretations of the external conditions involved in learning situations and following implications for their personal achievement goals become important.

2.3.4 Classroom goal structure and students' achievement goals

In the preceding sections it was explained how students' adoption of achievement goals is influenced by contextual factors. Accordingly, researchers in the field have become interested in explaining factors of learning context in light of motivation theory. The research has come up with information concerning various structures in the classroom such as learning tasks, evaluation practices, teacher authority, classroom goal structures, and student recognition practices that affect students' adoption of academic goals (e.g., Linnenbrink & Pintrich, 2001; Meece, 1991). Hence, it is assumed that every classroom has its unique composition of factors communicating academic goals; a goal structure of

the learning environment (Ames, 1992; Urdan & Midgley, 2003; Wolters, 2004) Goal structure originates from prevailing instructional practices and policies (Wolters, 2004). As it is assumed that learning contexts set frames for learning and that an individual learner's motivation can be invoked or subdued by classroom goal structures, it is important to know how classroom goal structure could be adjusted to provide an optimal motivational climate. In many studies the assumption has been that students' perceptions of classroom goal structure is unidirectionally influenced by the learning context and communicated abundantly through teacher's messages. This may, however, create a biased view of the flow of motivational messages in classrooms. As pointed out by Urdan and Turner (2005) "motivational climate in classrooms is produced by a reciprocal exchange of messages that flow constantly between students and teachers, and among students themselves". In addition to that, the classroom goal structure may be communicated through implicit messages, which are interpreted and generate further communication of goal structures. Thereby, it may be assumed that the nature of classroom goals is multidirectional.

Qualitative studies on classroom goal structures have explained how mastery and performance structures may be discerned in classrooms. Classroom discourse rarely focuses on purposes of achievement (cf. Urdan, Kneisel, & Mason, 1999). Instead, goals are mediated in classrooms by communication related to tasks, evaluation practices, recognition practices, utility value of classroom activities, authority structures, and grouping (Patrick et.al., 2001; Urdan et.al., 1999). A study by Patrick and her colleagues (2001) demonstrated that in those classrooms where mastery goal structure was emphasized teachers underlined students' active participation in learning, required involvement equally from all students, emphasized effort, were supportive towards the students, and supported peer interaction. These behaviours were not observed in the classrooms, which were characterized as having a low mastery focus. In high performance classrooms, focus on formal assessment and social comparison in achievement was observed. Most of the findings were, thus, consistent with previous work on the issue. Nevertheless, rewards were used in both in high and low mastery focused classrooms and also students' performance was made public. Urdan with his colleagues (1999) point out that "goal structures are largely subjective constructions" and illustrate how students' perceptions of classroom goal structures are affected by their developmental differences as well as by their achievement level differences.

Classroom goal structure is often perceived as performance goal oriented, at least in middle school (Anderman & Anderman, 1999). The findings reporting correlation between performance goal orientation and academic achievement could also be explained by the fact that performance goal structure is typical in schools and that grading procedures indicate performance (cf. Kaplan & Middleton, 2002). The importance of mastery goal orientation in learning is acknowledged and the findings concerning mastery goal structure are rather promising. For example, Urdan and Midgley (2003) demonstrated that changes in the perceived mastery goal structure of the classroom had stronger effects on student motivation than perceived performance goal structure. Accordingly, Wolters (2004) indicated that students who perceived a mastery goal structure in their classroom tended to adopt these types of goals themselves. It seems that by providing favourable goal structures in instruction, it is possible to support students' motivation to learn. However, as indicated by Wolters' (2004) results, students' subjective

perceptions of classroom goal structure play a more important role in students' adoption of goals than the objective classroom goal structure. Accordingly, making the objective goal structures of a classroom explicit is not necessarily enough and a voice should be given to students' interpretations. Furthermore, it should be noted that that different types of goal structures are not perceived exclusively in classrooms and therefore the multiple goals perspective should be taken into account when examining classroom goal structures (cf. Urdan et.al., 1999).

2.4 Interplay of achievement goals and cognitive learning strategies

In light of the theory on self-regulated learning, goals are key elements which join cognitive and motivational aspects of learning to each other. As noted in the chapter concerning motivation, goals may function on different levels. From the achievement goal orientation perspective, goals are associated, more or less, with general behavioural patterns involving certain types of self-related beliefs, cognitive strategy use, and levels of academic achievement. From a task specific goal level, goals are representatives of what learners are cognitively pursuing. Task specific goals can thus aim at mastering content, performing at a given level, or learning how to do something (e.g., Sansone & Harackiewicz, 2000). Self-regulatory processes are enhanced if the teacher does not predefine task specific goals and learners can define their task-specific learning goals themselves (Azevedo, Ragan, Cromley & Pritchett, 2002). Considering the role of goals within the scope of a learning process, they serve two major functions in cognitive self-regulation. First, they guide cognition in general by directing behavior towards the end-states they encompass, and second, they function as monitoring standards against which learners construct evaluations of their learning (Lemos, 1999; Pintrich, 2000b). Following this sequence, strategies can be seen to have an executive role in the goal strivings of an individual. Hence, strategies function mainly in the area of cognition, but considerably interact with and overlap learning goals (Pintrich, 2000c).

2.4.1 Achievement goal orientation, cognitive strategies and adaptive learning behavior

There is indication that certain types of achievement goal orientations are related to the use of certain types of learning strategies. This idea is deeply rooted in the achievement goal theory, which chiefly aims to recognise different goals leading to certain types of achievement behaviours (Ames, 1992). Regardless of the labelling of different types of goals, there is evidence that goals related to mastery, understanding, improving competence, task involvement and progress in learning lead to the use of both deeper level cognitive strategies (Ames, 1992; Ames & Archer, 1988; Graham & Golan, 1991; Nolen, 1988; Pintrich & Roeser, 1994; Pintrich & Schrauben, 1992; Radosevich, Vaidyanathan, Yeo, & Radosevich, 2004) and metacognitive activities such as monitoring cognition and becoming aware of one's understanding (Ames & Archer, 1988; Dweck &

Leggett, 1988; Middleton & Midgley, 1997; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991). In some studies mastery goals have been negatively correlated with the use of surface level strategies (Anderman & Young, 1994; Pintrich & Garcia, 1991). Research evidence seems to create a rather consistent picture of the positive impact that mastery goals have on a learner's cognitive processes.

Endorsement of performance goals, in contrast, decreases the use of deep cognitive processing strategies and is related to the use of surface level strategies (Graham & Golan, 1991; Meece et al., 1988; Meyer, Turner & Spencer, 1997; Nolen, 1988). On the other hand, Ames and Archer (1988) found no relation between performance goals and cognitive regulation of learning. The recent studies, conducted from the revised achievement goal perspective, suggest that performance-approach goals predict the use of surface level strategies (Elliot et al., 1999). Furthermore, they indicate that performance-avoidance goals are related to a lack of strategic activity (Radosevich et al., 2004) and are even negatively related to the use of deeper level strategies. There are few available studies in which avoidance goals are treated as stand-alone constructs. However, in basis on the existing empirical findings there are reasons to suggest that avoidance goals predict a lack of strategy use. The findings by Middleton and Midgley (1997) support this by indicating that avoidance goals are negatively related to strategic processing in terms of the number of different types of strategies the students reported using. Their findings do not, however, pursue the quality of strategies and also, more generally, there is lack of research evidence on the quality of strategies used by students endorsing avoidance goals.

It is widely assumed that the use of cognitive learning strategies and, in particular, deep processing are related to academic performance whereas surface processing is unrelated to academic performance (Pintrich, & De Groot, 1990; Zimmerman & Martinez-Pons, 1990). A study from a revised achievement goal perspective (Bouffard et al., 1995) indicates that students with both high mastery and high performance orientation use significantly more cognitive strategies and receive higher grades than students with other types of goals and their combinations.

Although the research in the field has helped us to map the relationships between these motivational and cognitive constructs, as Pintrich and Schrauben (1992) point out, hardly any direct relationship exists between the use of cognitive strategies, certain motivational factors or metacognitive activity, and learning outcomes. Rather, it is reasonable to assume that cognitive and motivational factors work in synergy in order to generate different types of learning (Alexander, 1997; Pintrich & Schrauben, 1992). Hence, allocation of cognitive resources varies as a function of a student's short term and long term goals (Boekaerts, 1999). This is to say, for instance, that sometimes learners' goals may affect their cognition more emphatically, whereas sometimes context specific factors such as social goals may make the learner behave in a different way. Learners may also have different kinds of assumptions about how much effort is needed to achieve different goals (Schunk & Zimmerman, 1994). According to Meyer et al. (1997), goals do not only direct strategic behaviour but they also affect learners' future goals. Therefore, it is important to recognize that the relationship between goals and students' achievement behaviour is complex and effected by several contextual and individual factors. Pintrich and Roeser (1994), for example, examined the path from mastery goals to deeper level strategy use in more detail. Their results suggest that use of cognitive strategies earlier in an individual student's studies were the best predictors of reporting more mastery goals

later. Hence, there are reasons to assume that relations between motivation and cognitive strategies are reciprocal, and there is a need to study these concepts with a multidirectional approach (Pintrich & Roeser, 1994).

What comes to the practical application of the relationship between goals and strategies, in basis of the assumption that both mastery and performance goals do enhance strategic activity and that students' goals are not stable, there are grounds to say that affecting both types of motives may potentially enhance the degree of self-regulation. Nevertheless, the utility of mastery goals in relation to self-regulation and particularly to deeper level strategy use has to be underlined.

2.4.2 Composition of motivational and cognitive processes within a learning context

Learning context has been acknowledged as a factor related to self-regulation, motivation, and use of learning strategies (e.g., Ames & Archer, 1988). In motivation, for example, the environmental factors that have effects on students' adoption of achievement goals can be extended to family, peer groups, community, culture, ethnicity, and historical context (Ames, 1992). Classroom context, in particular, is an important precursor of the motivational goals that students choose to pursue (Ames, 1992; Ames & Archer, 1988). There are various structures in the classroom, such as learning tasks, evaluation practices, teacher authority, classroom goal structures, and student recognition practices, which all affect students' adoption of academic goals (e.g., Linnenbrink & Pintrich, 2001; Meece, 1991). Hence, as noted previously, every classroom has its' own unique composition of factors communicating academic goals, a goal structure of the learning environment (Ames, 1992; Urdan & Midgley, 2003). In the same manner classroom practices, characteristics of a learning task, and teacher guidance set constraints on strategic behaviour and self-regulation.

The research information on the effects that classroom context has on self-regulation is, however, based to a large extent on quantitative studies where context is considered as a remote variable rather than an integral part constituting learning. Majority of this research has not been conducted in authentic classrooms and thereby there are reasons to reconsider the applicability of these findings. The recent qualitative studies have, nonetheless, provided important information about the classroom mechanisms and contextual characteristics of self-regulation processes. De Groot (2002), for example, demonstrated how motivational beliefs, cognitive strategies, and self-regulatory strategies were linked in a classroom context. In the study, the students who described themselves as good students reported more effective strategy use, using both a larger variety of strategies and applying them more frequently. Better students also acknowledged that environmental factors could influence their learning processes and that they tried to control those environmental factors. Poorer students were found to be more susceptible to, or chose to be under, the control of the environmental factors and teacher instructions. These results emphatically describe the relativist nature of self-regulated learning. That is to say that self-regulated learning is specified by particular social situations in which learning occurs and that different students respond to the same social situations in

different ways (Paris et al., 2001). Furthermore, it should be noted that contextual effects for motivation and strategy use could be mediated by other components of self-regulated learning such as interest, anxiety, and volitional control.

Although the research has recognized classroom factors that potentially support students' self-regulation and motivation, there is a need to consider the dynamics of classroom mechanisms, in which these factors function. The essential factors regarding student motivation introduced by Ames (1992) and critically developed by Blumenfeld (1992) include tasks, evaluation and authority. Understanding the dynamics of these factors become important when recognizing that goal messages do not necessarily have desired and theoretically assumed effects on students' behavior (for a review see Urdan & Turner, 2005). For instance, task variety in some cases increases interest and attention but at the same time, decreases cognitive engagement (Blumenfeld, 1992). Or, both mastery and performance elements exist in classroom situations because although competence development would be emphasized there is also a need to be accountable for learning and thereby include formal evaluation. Thus, the critical issue is to create balance between these goal structures (Blumenfeld, 1992). These examples illustrate how classroom mechanisms are systemic in nature and there is a need for holistic understanding of classroom as a context for learning (cf. Salomon, 1991).

Linnenbrink and Pintrich (2001) make an essential distinction between objective classroom structure and subjective and individual interpretations of it. Also Urdan with his colleagues (1999) and Ames (1992) recognized the need to emphasize subjective interpretations of classroom goal structure. Both objective classroom goal structures and subjective interpretations of that impact students' adoption of goals and subsequent cognitive processes. The definition of concept is not limited to objective perception of it and the subjective interpretations that individuals make of context are difficult to study. Despite this, the definition of context should be addressed by reaching out for the meanings that individuals give to the contextual cues and to the implications that these interpretations have.

2.5 Designing dynamic learning contexts that foster self-regulated learning, use of cognitive learning strategies and motivate learners

Educational psychology is a distinct research field that pursues both theoretical and practical goals (e.g., Mayer, 2001; Pintrich, 2000a). Hence, many researchers in the field have adopted the assumption that the goal of scientific understanding is so called "use of inspired basic research" (cf. Stokes, 1997). The way that research on self-regulated learning has generated practical classroom applications can be seen as a showpiece of this kind of joint endeavor between basic research and applied research (Paris & Paris, 2001; Pintrich, 2000a). Accordingly, self-regulated learning has functioned as a foundation for several pedagogical interventions that try to create opportunities for learning, as illustrated in several recent special issues of periodicals such as *Elementary School Journal* and *Educational Psychologist*. Paris and Paris (2001) even propose that self-regulated learning inherently has both theoretical and practical foundations.

Boekaerts and Niemivirta (2000) indicate that self-regulated learning arises when opportunity and a personal feeling of necessity coincide. Supporting this idea, the aim of classroom pedagogical interventions is to create opportunities for self-regulation and to invoke personal engagement in self-regulation processes by enhancing motivational, cognitive, and emotional processes. Boekaerts (1999) proposes that so called powerful learning environments not only encourage students to engage in self-regulation, but can also facilitate the adoption of self-regulated learning skills and thereby have consequences on learners' self-regulation in the long run. Hence, the endeavors aimed at developing theory-based pedagogical models encompass a strong wish to transfer the skills acquired in the intervention to subsequent learning contexts. This involves a successful transfer effect, which is dependent on successful initial learning and the development of self-regulatory skills (e.g., Campione & Brown, 1990; De Corte, 2003). When considering motivation, it can be anticipated that over time, contextual goals and structures embedded in instructional practices can affect students' general goal orientations and the way students adopt task-specific goals in future learning contexts. Hence, if the aim is to affect students' self-regulatory processes by designing classroom contexts, it would be valuable to understand under what conditions students adopt motivational goals or demands for self-regulation and integrate them into their personal preferences (Boekaerts & Niemivirta, 2000). This requirement is supported by findings questioning the effects of pedagogical interventions aimed at enhancing self-regulated learning (e.g., Perry, 1998).

As the previous review on self-regulated learning attests, there are several aspects which can be highlighted not only in the theoretical models, but also in interventions of self-regulated learning. In the following discussion, the effects that classroom components and interventions might have had will be examined. Attention should be paid to the fact that studies from different perspectives (such as motivation, cognitive strategies, and so forth) are included in the discussion. This approach was chosen in order to focus on the classroom characteristics that interventions concentrate on. At the same time, it should be noted that a distinction should be made between the different aspects and sub processes of self-regulation. There is the danger that by making no distinction between self-regulation and cognitive self-regulation and the use of cognitive strategies (e.g., Azevedo et al., 2004; Ryan & Patrick, 2001), and dynamics between other components of self-regulated learning will be underestimated. Therefore, studies on motivation, cognitive strategies, and self-regulated learning with different focuses will be included to present a review of classroom structures affecting self-regulation; and their particular theoretical and empirical focus will be communicated.

2.5.1 Activating self-regulation by classroom structures

It is paramount to understand classroom instructional practices, as through them, implicit and explicit messages to students about the reasons for engaging in learning are indicated (Ames, 1992). Once again, goals function as a basic component that outline students' achievement behavior. In particular, the classroom goal structure seems to be relevant (Urdan & Midgley, 2003). Classrooms are inherently social contexts in which

collaboration and discourse among participants shape motivational, cognitive, and self-regulatory processes (Boekaerts & Niemivirta, 2000, p. 446; McCaslin & Hickey, 2001; Meyer & Turner, 2002; Patrick & Middleton, 2002). Although self-regulated learning processes emerge within a learning context and within a unique learning situation, it should be recognized that self-regulated learning is not a set of skills to be taught. Instead, it can be regarded as an outcome of students' pursuits to adapt to learning situations in a meaningful and coherent manner (cf. Paris & Paris, 2001). Hence, underlining the self-regulatory skills –aspect by encapsulating it as a set of skills and characteristics may intrude on the theoretical distinctiveness of contextual self-regulation and reduce its explanatory power. Instead, it is important to understand the classroom elements that are involved in the composition of contextual self-regulation.

Classroom social environment constitutes several elements which potentially affect students' self-regulation. According to Deci and Ryan (1996), "self-regulation can be facilitated by social contexts that allow satisfaction of the basic psychological needs for autonomy, competence and relatedness". Therefore, positive classroom climate, autonomy, shared responsibility for learning and social relatedness are the foundations for student participation and development of self-regulation (Meyer & Turner, 2002). Realizing this kind of classroom evidently requires interpersonal involvement (both students and teachers) and acknowledgment of feelings (cf. Corno, 1993). Ryan and Patrick (2001), for example, found that students' perceptions of their teacher's attempts to support and promote interaction and show mutual respect were related to positive changes in students' motivation and engagement in learning.

Indeed, *teacher* plays a major role in creating contexts that support self-regulated learning. The way that teachers communicate classroom goals has recently been a topic under investigation. Clearly articulated goal messages which reduce the emphasis on performance goals can be beneficial for student motivation and learning (Urdan et al., 1999). In particular, an increase in perceived mastery goal structure can be advantageous in terms of cognition, effect, and performance (Urdan & Midgley, 2003). This is in line with findings by Ryan and Patrick (2001), who reported that students' perceptions of the teacher as promoting performance goals were related to negative changes in student motivation and engagement. However, it should be noted that different students might perceive the same classroom goal messages differently. The goal messages can not only include direct statements of task-specific goals but also discourse aimed at supporting students' developing perceptions of task difficulty, communications of the belief that challenge is a good thing and indications that errors present important opportunities for learning (Perry & VandeKamp, 2000). Furthermore, it has been shown that, in addition to communicating mastery goals, teachers can promote motivation through certain types of teacher discourse. Turner et al. (2002) and Turner, Meyer, Midgley and Patrick (2003) reported that teacher discourse included a lot of motivational support in classrooms where students reported high mastery/low avoidance goals. Teachers have several ways to enhance cognitive self-regulation and use of cognitive learning strategies. Several studies report that by modelling, scaffolding and coaching strategy use, teachers can enhance students' cognitive self-regulation (Hamman et al., 2000). Teacher scaffolding should also be explicit and extensive (Perry & VandeKamp, 2000). Perry, VandeKamp, Mercer and Nordby (2002) indicated that by offering choices, providing opportunities for controlling challenge through providing instrumental support from peers and by giving

non-threatening evaluation, teachers could promote SRL in the classrooms. Finally, it is paramount that teachers have an understanding of how their classroom practices influence students' learning (Perry, 1998) and that they listen to their students' views because students' subjective perceptions of the classroom practices play a major role in goal setting and classroom learning.

Curriculum changes endorsing *inquiry and problem based learning* are topical in several schools nowadays. For instance, Patrick and Middleton (2002, p.29) argue that "success in problem-based learning requires cognitive, metacognitive, motivational and collaborative engagement that comprises self-regulated learning". One of the aims of providing these types of activities is to get students to develop self-regulatory competencies which extend to future learning situations (cf. Paris & Paris, 2001). It is also important that students have some choice over the tasks they engage in, that the tasks have optimal difficulty for the student, and that the tasks aim at developing students' competence (e.g., Perry & VandeKamp, 2000). The results of Pintrich and Roeser (1994) indicated that students more often reported mastery goal orientation and more frequently used cognitive strategies and regulated their own thinking when the teacher made the work interesting, explained the topics, allowed students to work with each other, and gave students a choice of tasks.

The final classroom component that creates constraints and possibilities for self-regulated learning is *evaluation practices*. Several research findings highlight the meaning of competence and improvement based evaluation, where mistakes are seen as an impulse for future development (Perry et al., 2002; Pintrich, Marx & Boyle, 1993). Evaluation practices with informational value will help students to engage in future learning tasks because they learn more about their learning process than they do from a grade with no explanation. Hence, evaluation should involve links to tasks which learners have been working with. Furthermore, it is argued that in order to foster students' skills at evaluating their own learning and to enrich the sense of ownership of learning, evaluation practices should also involve self- and peer evaluation.

2.5.2 Self-regulation in technology-rich learning contexts

A study of students' achievement goals and cognitive learning strategies in the classroom would be incomplete without a consideration of the potential influence of learning technologies. Without doubt, technological development has reformulated our cognition and learning processes. Technology can be seen as a way to provide useful tools to improve learning (Bransford, Brown & Cocking, 1999; De Corte et al., 2003). Approaches like computer supported collaborative learning (CSCL) involve the development of theory-based learning practices, where technology is used as a tool for enhancing meaningful learning. A growing body of research evidence demonstrates the positive effects of CSCL (Koschmann, 1996; Koschmann, Hall, & Miyake, 2001). Particularly the pedagogical models involving problem-based activities and classroom structures described in the previous section often accompany technological tools. In the light of existing research evidence, there are reasons to suspect that these joint endeavors involving pedagogical and technological development create challenges, but also offer

novel possibilities for self-regulated learning (Paris & Paris, 2001; Patrick & Middleton, 2002; Perry et al., 2002). Nevertheless, there might also be potential drawbacks in using technology-rich learning contexts, such as increased cognitive load (Chandler & Sweller, 1991), undeveloped CSCL learning culture (Hakkarainen et al., 1998) and lack of learners' skills to use technological tools to support learning (Hartley & Bendixen, 2001). Therefore, it is important to build understanding of the conditions under which technology can potentially support learning.

Technological tools are designed to support both individual thinking and socially distributed knowledge construction (Koschmann, 1996). Technology can support the learning of an individual student by structuring the inquiry, providing tools for keeping a record of activities, and by pointing out essential phases of the process using tools that direct the student's meta-cognitive awareness and enhance reflection (Pea, 1993). There is also evidence indicating that technological tools can enhance students' conceptual understanding by providing tools for organising, representing and visualising knowledge (e.g., Pea et al., 1999; Rochelle & Pea, 1999). For example, the goal of CSCL inquiries is to enhance students' long-term potentials and conceptual understanding, rather than to contribute to students' short-term retention of the learned content or task accomplishment. Furthermore, in collaborative inquiries, students are challenged with activities that require them to perform such cognitive operations that are not likely to be performed without the use of deeper level and meta-cognitive strategies. It may be anticipated that inquiry-based learning situations even generate new types of cognitive self-regulation and strategic activity, and encourage students to apply different strategies when compared to traditional academic tasks (Paris & Paris, 2001, Turner, 1995). These higher-level knowledge construction processes are, nevertheless, invoked only if students have skill and will to engage in utilizing the potentials of CSCL environments. Hence, self-regulation and strategic skill to utilize these potentials play an important role in technology-rich learning contexts. However, the evidence of how students actually engage strategically in these environments and how students' self-regulatory processes take place in technology-rich learning contexts is scarce.

In the CSCL paradigm collaboration processes are emphatically seen as instigators of individual learning and vice versa. A study by Linn, Bell and Hsi (1998) indicated that middle school students were capable of creating coherent arguments, reflecting their ideas and explicating different perspectives on science in collaborative CSCL discussions. By means of CSCL, it is possible to create learning communities in which students have a chance to collaboratively make representations, develop explanations of the subject studied, and participate in expert-like practices of knowledge construction (Scardamalia & Bereiter, 1994). Correspondingly, Cohen and Scardamalia (1998) reported findings that demonstrated how CSCL enhanced social knowledge construction and created a more solid basis for reflective activity compared to face-to-face interaction in 5 and 6th grade science learning.

The conceptualisation of self-regulated learning as an intra-individual process does not necessarily account for regulatory processes in learning contexts involving collaboration, such as CSCL. Hence, there are reasons to consider alternative conceptualisations for self-regulation such as the co-regulation perspective by Hickey and McCaslin (2001). As the intention of CSCL is to create learning practices where all learners engage together in knowledge construction processes and share their cognitive efforts, there are reasons to

believe that motivational and regulatory processes will derive some characteristics from socially shared activity. The considerations of self-regulation in collaborative learning contexts are at the theoretical level for now and empirical evidence would be needed to enlighten the issue. It would be important to analyse, for instance, if students actually share regulation processes in CSCL context and how students regulate their collaborative actions.

In addition to increased possibilities of conceptual advancement and collaborative knowledge construction, there is also an indication of the positive influence of CSCL in student motivation. Studies by Järvelä (1996) and Rahikainen, Järvelä and Salovaara (2000) show how CSCL can restructure the motivational interpretations of non-task-oriented students and contribute to their task engagement. The motivational effects seem to be plausible as CSCL contexts involve classroom practices and classroom goal structure that support meaningful learning and enhance student motivation. However, the specific processes leading from classroom practices to desirable student motivation are rather unclear.

Taken together, these classroom and other pedagogical interventions are highly valuable both by enriching learning practices and by providing information for the theoretical development on self-regulated learning. Further evidence is, however, needed to build more comprehensive understanding of the conditions under which technology optimally supports learning and how technology interacts with the learner characteristics. Technology seems to offer new possibilities for motivation and self-regulation although only scattered research evidence on the issue exists. The problem of both lines of interventions is that some of the studies in the field have approached the entire issue of self-regulation without making a distinction between the sub-processes involved in it. Thus, there is the danger that the theoretical clarity and distinctiveness yielded by approaching self-regulated learning through empirically examined constructs representing the sub-processes will be lost. The SRL interventions are highly valuable in creating and disseminating theory-based practices in classrooms, but more work should be done to fully utilize the theoretical distinctiveness of self-regulated learning theory for explicating how these interventions function in natural contexts and in real classroom situations.

3 Methods for investigating motivation and cognitive strategies in context

The theoretical shift towards contextual perspective in educational psychology has caused changes in the methods that are used in investigating learning and motivation. As pointed out by Pintrich (2000a) methodological development is vital because if the new theoretical models are not tested empirically, they cannot contribute to the development of a scientific educational psychology. The methodological development may, in addition to theoretical aims, be driven by an endeavour to inform educational practice (Hickey & McCaslin, 2001; Pintrich, 2003). The recent methodological development has tried to find innovative, yet rigorous ways to investigate individuals within learning contexts and to carry out investigations in real-life settings rather than in controlled experiments (cf. Pintrich, 2000a, 2003). As Anderson, Greeno, Reder and Simon (2000) point out, merging situative and individual approaches can contribute to more coherent scientific understanding of learning. Furthermore, methodological development is needed, particularly when context is not considered as an isolated variable, but one inseparable element that constitutes learning processes (Barab & Squire, 2004). Without doubt, the field of educational psychology has been dominated by quantitative methods. During recent years, qualitative methods such as interviews, analyses of social interaction, observations, and video recordings have been emerging in educational psychology to illuminate contextual features as well as individual perspectives and to diversify the research. Thus, the challenge in methodological development seems to be not only in developing innovative practices for analysing learning from a contextual perspective but also for building on the existing methodological knowledge.

3.1 Self-reports as dominating methods in the field

The methodological field of motivation and particularly achievement goal research has been dominated, to large extent, by self-report questionnaires (Bong, 1996). Accordingly, their methodological dominance can also be seen in the field of self-regulation research (Winne & Perry, 2000). Extensive efforts have been applied developing self-report scales for investigating motivation and learning strategies (e.g., Motivated Strategies for

Learning Questionnaire, MSLQ, by Pintrich et al., 1993; Learning and Study Strategies Inventory, LASSI, by Weinstein, Schulte & Palmer, 1987; Patterns of Adaptive Learning Survey, PALS, by Midgley et al., 1996). Concerning learning and motivation from a contextual perspective it is problematic, however, that behind these methods there underlies a rather strict conception of motivation and cognitive skills as individual aptitudes. Hence, when considering learning and motivation as an interactive process between an individual and a context, more dynamic and situation-sensitive methods are needed.

In self-reports, there are limited possibilities to portray the same, sometimes multifaceted, constructs (Bong, 1996). It is reasonable to assume that when the constructs of motivation and self-regulation research are empirically investigated in dynamic learning contexts, the phenomena that the constructs need to account for will embody new dimensions. Accordingly, variability of contexts has resulted in discrepancy among motivational constructs when self-reports have been used in measuring them (Duda & Nicholls, 1992). Furthermore, as Patrick and Middleton (2002) argue, self-report questions that are designed for measuring self-regulated learning in traditional instruction and as an aptitude may obscure some perspectives of self-regulated learning. They do not necessarily account for the phenomena when they are applied in non-standard learning contexts. For example, inquiry-based instruction facilitates different aspects of self-regulation than conventional instruction. Self-reports may also lack sensitiveness to other contextual features of self-regulated learning that are particularly important when examining self-regulated learning as an event comprising both individual and contextual features rather than a merely individual aptitude encompassing different learning situations (Perry, 2002). To attain contextual perspectives better, longitudinal instead of one-off designs, and person-centred instead of variable-centred approaches have been proposed (e.g., Bong, 1996; Elliot et al., 1999; Pintrich, 2000c).

Self-reports are based on the assumption that individuals' beliefs, conceptions of self and conceptualisations of behaviour tell how he or she behaves in a learning situation. However, it is reasonable to ask that to what extent students' self-reports describe their actual motivational or strategic behaviour. Winne and Jamieson-Noel (2002) studied calibration between students' self-reported study tactics and the actual use of study tactics. Their results indicate that students' self-reported perception of their studying was more active and varied than it actually was. Also Hadwin et al., (2001) demonstrated that contexts moderate students' self-reports. These findings argue that in the studies where the aim is to understand students' actual behaviour, instead of investigating their conceptions of it, there is a need to complement self-report measures with other methods that more objectively describe students' behaviour.

The criticism towards self-reports is not to say that they should not be used, rather that by using them a rather solid theoretical understanding has been constructed in the field. To gain a more comprehensive understanding of learning and motivation in different contexts, recognition of advantages and disadvantages of the methods and development of alternative or complementary methods is, however, needed.

3.2 Using qualitative methods for investigating learning processes and individual's interpretations in context

Qualitative methods have been proposed to enrich the discussion and to provide a more situational perspective to empirical studies in educational psychology (Anderman & Anderman, 2000). Also more specifically in the field of motivation and self-regulation research these methods have been proposed to provide a more contextual perspective (Perry, 2002; Volet & Järvelä, 2001). Qualitative methods typically involve rich, holistic descriptions and recognise settings and contexts in which the phenomena are embedded (Miles & Huberman, 1994). Qualitative methods do not make assumptions of intra-individual stability, and they are oriented to reveal complexity. Hence, they support in-depth investigations of motivation and self-regulation from a contextual perspective (cf. Patrick & Middleton, 2002; Perry, 2002). Considering the focus of the current dissertation study, the two most important aspects characterizing the power of qualitative methods are context- sensitiveness with an orientation toward the learning process and openness for an individual's interpretations.

The endeavour to apply context-sensitive methods stems from a wish to understand the interaction between an individual and the context he or she is in. To make this true, more and more studies are carried out in real classroom situations instead of in strictly controlled laboratory experiments (Paris & Paris, 2001). Researchers are, for example, trying to depict contextual elements of learning situations to understand their effects on motivation (e.g., Urdan & Midgley, 2003). It should be noted, however, that as the relationship between an individual and a context is reciprocal, the methods should also reach out to this relationship rather than focussing on the contextual variables that affect individual learning. In process-oriented methods, the focus is on situating the target behaviour into the process it is embedded in. Hence, process-oriented data tries to capture some of the features unique to the targeted learning situation in order to provide a basis for detailed and conceptualised interpretation of the data. Several process-oriented, on-line methods have been developed such as process-oriented interviews (e.g., DeGroot, 2002), on-line questionnaires (e.g., Boekaerts, 2001), video observations (e.g., Järvelä & Niemivirta; 2001) and think aloud methods (e.g., Pape & Wang, 2003).

Interviews are useful methods for capturing students' interpretations in real contexts and real time (De Groot, 2002; Perry, 1998; Perry & VandeKamp, 2000; Turner, 1995). They are particularly valuable for gaining an understanding of how individuals interact with the context as they enable interviewees to express their individual interpretations of the learning situation at hand. Students may perceive and interpret the same learning situations differently (cf. Ryan & Grolnick, 1986). When the aim is to gain understanding from a contextual perspective, the interviews should not be structured so that they prompt students to describe their typical behaviour in a situation, but rather their behaviour in that particular situation in which the interview is anchored (Winne & Perry, 2000). Perry et al. (2002) used retrospective interviews that were linked to observations to illuminate learners' internal processes that are not otherwise observable. These kind of process-oriented interview methods may result in more precise information about what students actually do when compared to self-reports or decontextualized interviews in which students are asked how they usually learn.

The structure of an interview can range from a highly structured interview to a more descriptive and open-ended one depending of the focus of a study. Zimmerman and Martinez-Pons (1986) developed a structured interview framework on self-regulated learning strategies. The advantages of this kind of theory-based, highly structured interview are replicability and comparability. However, as the structure for the interview was predefined by theory-based categories, possibilities for making contextual and emerging interpretations were reduced. A study by Dowson and McInerney (2003) on motivational goals provides a contrasting example of how a less structured interview is more likely to support inductive and contextual approaches and open new theoretical meanings for concepts. In the study the students' responses were not restricted by any predefined categories and the students were able to describe authentically what they were doing and experiencing. Interviews can also provide information on how different constructs are related to each other. In a study by DeGroot (2002) interviews provided insight on how students make connections between motivational and cognitive constructs. Taken together, qualitative methods, such as interviews, are often labor intensive and do not necessarily provide a basis for making useful generalizations, but provide valuable in-depth information of students' learning processes.

3.3 Mixed-method approaches

Following Pintrich's (2000a) view, the aim of understanding an individual in context calls for using both quantitative and qualitative methods and a general concern "to provide good, valid and reliable evidence to support our inferences and conceptual models regardless of the nature of the general methodology" (p. 223). Hence, there are more and more examples of studies in which both quantitative and qualitative methods are used to compose mixed method designs (cf. Creswell, 2003; Tashakkori & Teddlie, 1998). The methods can be mixed at different stages of a study: modes of inquiry, data collection, and analysis. Mixed method approaches provide means to triangulate and to compensate for inherent weaknesses of one methodology by using other methods (Tashakkori & Teddlie, 1998). For example, it has been claimed that in qualitative studies the focus is focussed too much on single cases and the studies may thereby lack reliability (Yin, 1991). Accordingly, mixed method approaches can situate the qualitative data of a single case in a more general context and present general trends originated from quantitative data of a larger group (e.g., Many et al., 1996). Mixed method designs can also result as a comprehensive combination of results where both common themes and discrepant findings are presented (Butler, 2002). Different data can even illustrate different facets of a phenomenon (Tashakkori & Teddlie, 1998; Creswell, 2003). Furthermore, as Turner (2001) denotes, a mixed method approach has advantages such as complementarity to examine different facets of the topic under investigation and initiation to recognise paradoxes.

In the field of motivation and self-regulation research it has been proposed that self-report measures should be complemented with other types of measures (Perry, 2002). As Bong (1996) states, the way self-reports are used overlooks motivational fluctuation, and she furthermore suggests qualitative data to provide a deeper understanding of motivation

within a learning situation at hand. Patrick and Middleton (2002), for example, complemented data derived from self-report surveys by observations and student interviews. Their results indicated limited congruence among measures and lead to a discussion about construct validity. Furthermore, their results questioned the applicability of self-reports in classrooms utilizing social-constructivist approaches and curricula and, hence, established new research questions concerning the contextual dimensions of self-regulation.

3.4 Finding empirical evidence and developing educational practice by engaging in design based research

The recent reviews concerning the whole field of educational psychology uniformly communicate a growing interest in using scientific understanding in developing classroom practices (Anderman & Anderman, 2000; Pintrich, 2000, 2003). Brown's (1992) opening functioned as an impetus to development of a new research paradigm, originally named as design experiments and lately as design based research, which are committed not only to experimenting with theoretical concepts in real-life classroom situations but also for developing classroom practices through research. A fundamental assumption of the approach is that context matters and, hence, context cannot be studied as an isolated variable but rather situated in the whole research process in naturalistic contexts of learning (Barab & Squire, 2004). By undertaking this kind of approach, design based research tries to dissolve the gap between theory and practice. Design based research involves testing of theory-driven technological tools, curriculum, pedagogical models and practical interventions and at the same time essentially contributes to contextually based theories of learning (The Design Based Research Collective, 2003).

In design based research, scientific and utility goals are pursued by engaging in iterative cycles of making theory based pedagogical designs, experimenting with them in classrooms, collecting diverse types of data and analysis and redesigning (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003). Consequently, research is typically carried out in longitudinal settings. As pointed out by Barab and Squire (2004), the focus of design based research is on developing a theory that characterizes the design in practice, with context being a core part of the story. This kind of approach requires development of innovative methodologies capturing contextual learning processes. Therefore, design based research studies can utilise multiple sources and several types of data and combinations of qualitative and quantitative analysis (Collins, Joseph, & Bielaczyc, 2004).

The current dissertation study adopts several features of the design-based research paradigm. In the strictest sense, the current study is on the borderline of the definition since the focus of the iterative pedagogical design process was in creating inquiry-based practices. However, the focus of the empirical analysis was in the motivational and cognitive processes of the students. However, the study fits the general definition of design based research as the analysis sheds light on the cognitive and motivational effects of the pedagogical design. It was assumed that inquiry based computer-supported collaborative practices could have certain effects on students' motivation and cognition

(for reviews, see article I and III) and, consequently, one of the initial ideas was to study how this pedagogical design could result in motivational and cognitive effects and generate variations in students contextual motivational interpretations and use of cognitive strategies. The individual articles of the current dissertation do not provide an overall picture of the current study as a representative of design based research. Rather, the overall design of the study constitutes such a study by analysing cognitive and motivational learning processes in a real-life context where a theory-driven pedagogical model is implemented. Table 1 represents the aims of the dissertation study related to theoretical and pedagogical development.

Table 1. Characterizing the current dissertation study as a design-based research study in terms of a designed pedagogical model and theoretical work.

Designed pedagogical model and local impact	Theoretical work
Development of an inquiry-based computer supported collaborative learning model for upper secondary school literature class	Analysing students' motivation and cognition in inquiry-based computer supported collaborative learning; focussing particularly on achievement goals and cognitive strategies; Potential value of the pedagogical design in terms of motivation and cognition

The methodological challenge of the current study is to characterize the motivational and cognitive processes by understanding the interaction between an individual and contexts he or she is studying in. Hence, from a methodological perspective this dissertation aims to find context sensitive, yet rigorous methods for investigating achievement goals and the use of learning strategies. In light of design based research, the study develops a model of inquiry-based computer supported collaborative learning for an upper secondary literature class and analyses the motivational and cognitive effects of it. In the light of the preceding theoretical and methodological discussion, both qualitative and quantitative, person and variable centred, trait and state perspectives are perceived in the manner in which it is assumed that the learning processes emerge and unfold in the person –context interaction.

4 Aims and methods of the study

4.1 Aims

The general objective of the study is to investigate students' achievement goals and cognitive strategies in an authentic and dynamic learning context. To enable this, a pedagogical intervention involving inquiry-based computer supported collaborative learning was created to represent a learning context derived from current learning theoretical understanding.

- I *The first aim* is to examine the nature of students' cognitive strategies in a learning context involving problem-based activities and computer supported collaborative learning. The nature of cognitive strategies is investigated in detail in the studies I and II.
- II *The second aim* is to analyze how students' achievement goals appear within learning context. The study III examines qualitatively the students' contextual goal interpretations across three years and study IV undertakes a mixed-method approach on the students' achievement goals.
- III *The third aim*, which integrates the first and the second aim, is addressed in study III. There the interplay of students' achievement goals and cognitive strategies is investigated by a qualitative approach.
- IV *The fourth aim* is to explore and discuss how cognitive learning strategies and students' achievement goals unfold in computer-supported, inquiry-based practices representing current learning theoretical understanding. Studies I, II and III discuss findings related to this aim.

4.2 Subjects

The empirical data for this study is derived from two classes of secondary school students. Although the intervention – comparison setting is explored only in Study II, both of the groups and undergone data collection procedures are described here for both of the groups respectively. The three-year data collection was carried out when the students were at the 7th, 8th and 9th grade at the age of 13 to 15. There were 18 students in

the intervention class, 6 boys and 12 girls. In the comparison class there were 25 students, of which 15 were boys and 10 girls. Throughout the three years of the study, 21 of these 25 students remained in the comparison class. The participants were homogenous in terms of race and cultural background. The classes were from different schools from the same Finnish city and were situated in an urban area with similar socio-economic status. The literature teachers in both classes volunteered to oversee the research project. Neither the students nor the teachers had prior experience with inquiry-based learning or computer supported collaborative learning (CSCL), which provided the pedagogical context for the study. The fieldwork of the study was carried out during the years 1998-2001.

4.3 Instructional setting

In the intervention class, the three-year-study involved four inquiry-based CSCL projects. The first, which was an introductory project, and the second project were implemented during the first year of the study, when the students were in 7th grade. During the second and third year (8th and 9th grade) the students conducted one inquiry project per school year. The topics for the projects (“Racism”, “Time”, “Science Fiction” and “Literacy analysis”) were derived from the literature curriculum. Each project lasted 6 to 8 weeks and the students had two to three 75 minutes project lessons per week. Before the first project, the literature teacher of the intervention class familiarized himself with the ideas of collaborative inquiry as well as with the computer environment that was used in the classroom to support the inquiry-based CSCL projects. The researchers and the teacher planned the learning projects together. The projects were designed by following socio-constructivist ideas and pedagogical principles of inquiry-based learning (cf. Hakkarainen & Sintonen, 2002). The theoretical background of inquiry-based CSCL practices is described in detail in Study I. In the current study, a problem-based approach to learning, active meaning defining, collaborative knowledge construction, and students taking responsibility for their own activity were the main pedagogical principles. The students’ inquiries and their individual and collaborative work were partly carried out in a CSCL environment. The literature teacher of the intervention group had the main responsibility for planning the inquiry project, but he received pedagogical and technical support from the research team, as the framework of CSCL inquiries was new for him.

Each project followed the same overall structure of inquiries. In the beginning of the projects, the teacher introduced the topic to the students. Then the students sketched their preliminary ideas and proceeded to write out their individual inquiry questions and planned the forthcoming inquiry procedure. Next, the students conducted their individual inquiries by collecting information and sharing their knowledge and ideas through collaborative technology. Through recurring cycles of presenting information, commenting on each other’s work, and revising, the students proceeded in their inquiries and finally summed up the results of inquiries to the collaborative database in the form of an essay or a report. The collaborative discussion in the CSCL environment was ongoing throughout the project. Both the teacher and the students participated in commenting on and sharing of ideas.

Two CSCL tools, CSILE (Computer Supported Intentional Learning Environment) (Scardamalia & Bereiter, 1994) and its' further developed version KnowledgeForum (<http://csile.oise.utoronto.ca/>) were used in the classroom interventions to help the students of the intervention group to conduct their own investigations and to create forums for social knowledge construction. The environments support students' learning by providing tools for inquiry-based activities, discussion, and knowledge production. Basically, they consist of empty hypermedia databases in which the students produce the contents. Student present their own research questions, intuitive working theories and new knowledge in the form of textual, graphical, and discussion notes. The basic assumption is that all notes are open to the other members of the learning community and all students have equal possibilities to participate to the activity. The applications contain tools for producing, storing, seeking, classifying, and linking knowledge and discussion tools. Student learning is supported cognitively by helping them to articulate, explore and structure knowledge. Applications also include tools for generating discussion on the topics and possibilities for commenting each other's notes so that students, teachers and experts can collaboratively work with knowledge.

The classrooms where the students were studying were equipped with several computers to provide the students access to the CSCL environments during the projects. Before the first literature project in the 7th grade, the students received training to use the CSCL environment. The training was carried out in chemistry lessons in the beginning of the semester. During the projects, detailed instructions for using the environments were available nearby the computers and the teacher helped the students to solve their possible problems with the CSCL environment. The amount of time that the students spend with the computer environment varied according to the preferences of each individual student. All of the students had to document certain important phases of their inquiries, such as research questions, new information, and final report or essay on the topic under investigation, in the CSCL environment and comment other students' work. Nevertheless, the instructions in each of the projects gave them freedom to choose how often and intensively they worked with the environment, and how many notes and comments they produced. Thus, some students used the CSCL environment to make notes and comments in every project lesson whereas some students chose to produce less computer notes and comments. In basis of the observations by the researchers both the teacher and the students seemed to be comfortable with the technology and adopted the CSCL environment as a tool for their classroom work.

What comes to the motivational classroom structure, the intervention groups' literature classes were organised so that they supported mastery goals. This was realised in the inquiry based pedagogical activities as they endorsed understanding of the content under study, promoted students' engagement in the learning, stressed personal meaningfulness of the learning materials and aims, involved collaborative knowledge construction and undertook participatory evaluation practices assessing an individual students' progress without a comparison aspect (cf. Hakkarainen & Sintonen, 2002; Scardamalia & Bereiter, 1993). Furthermore, in the literature classes of the intervention group the teacher authority was low and the classroom practices emphasis on students' own governance of the learning process.

Instruction in the comparison group's literature class followed the typical Finnish curriculum and procedures of Finnish secondary schools. This was ensured by an

interview with the literature teacher of the comparison group, carried out before the study. The motivational classroom climate emphasized performing well in academic tasks due to the quality of the learning tasks, teacher authority in goal setting and assessment practices. The differences in classroom philosophy between the intervention class and the comparison class are explicated in the Table 2, which applies the grouping principles of the elements of a classroom intervention presented by Brown (1992).

Table 2. Differences in classroom instructional setting of the intervention literature class studying by inquiry-based CSCL and the comparison class undertaking conventional instruction.

Role	Conventional literature class	Intervention class
Students	Recipients of incoming information	Students' as researchers
	Completing predefined learning tasks	Responsibility of own inquiry Participating in collaborative knowledge construction
Literature teacher	Responsible for learning	Facilitator of learning
	Didactic teaching	Guiding, scaffolding and modelling inquiry practices
	Classroom manager	Enhancing literature analysis
Content	Emphasis in technical literature skills	Emphasis in analytic and inquiry skills in literature
	Breadth	Depth
	Retention	Understanding
Learning activity	Drill and practice	Conducting inquiries in literature
	Essays	Participation in collaborative knowledge construction
Computers	Word processor	Tools for inquiry-based learning and collaborative knowledge building
Assessment	Fact retention	Knowledge discovery and analytical approach in the inquiry projects
	Comparative	Achievement related to personal standards
	Performance-based	Portfolio
	Based on teacher's judgements	Self-, peer- and teacher-assessment

4.4 Research design

The research design, introduced in the Figure 1, was a longitudinal, quasi intervention design involving multiple methods of data collection (cf. Creswell, 2003). The aim was to approach the phenomenon under investigation from multiple perspectives and data sources. Students' contextual interpretations and perceptions of their own behaviour were emphasised. Thought processes involving students' perceptions of their motivational goals as well as cognitive strategies are rather invisible and cannot be captured directly. Therefore, an interview method was applied. In case of motivational achievement goals

self-report and interview data were combined to provide a mixed-method design, which is reported in Study IV.

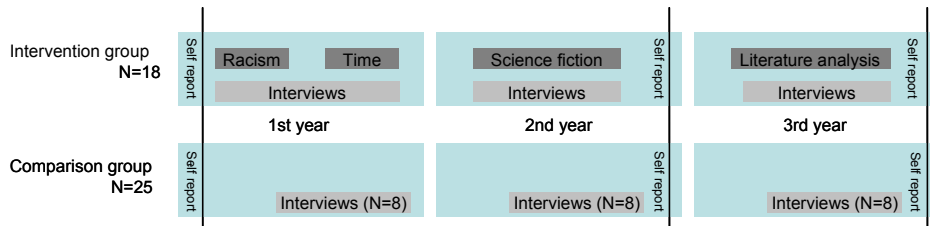


Fig. 1. Research design

4.5 Data collection

4.5.1 Self-report questionnaires

A self-report instrument on goal orientations and motivational beliefs was applied in the study to illuminate the students' achievement goals in orientation level (for validation of the instrument see Niemivirta, 1998). The whole instrument consists of 53 items related to different motivational variables such as self-related beliefs, means-end beliefs, and goal orientation. Following the research questions of the current study, only the subscales related to mastery, performance and avoidance goal orientations were included in the study. Each of these three subscales consisted of 5 test items (see article IV for a detailed description and the test items) and so 15 test items were used. A 7-point Likert scale was applied in the instrument. The items concerning mastery orientation assessed students' conceptions of learning as gaining knowledge and enhancing mastery, the items concerning performance orientation assessed students' desire to perform better than the other students and to receive rewards of studying, and the items concerning avoidance orientation assessed students' wish to accomplish learning tasks with minimal effort.

The self-report questionnaires were addressed to the students three times during the study, first in the beginning of the three year study at the 7th grade, second at the end of the 8th grade and finally for the third time at the end of the 9th grade (see Figure 1).

4.5.2 Process oriented interviews

In the study, altogether 161 process oriented interviews were conducted. The purpose of the interviews was to illuminate students' contextual interpretations of their motivational goals, strategic activity, self and the learning environment. The process-oriented interviews followed a semi-structured interview framework, which is introduced in detail in Study III.

The interview data were analyzed by a qualitative content analysis (Chi, 1997). Different analyses were carried out according to the research questions posed in the different studies and, accordingly, the analysis procedures are described in detail in each of the studies.

4.5.3 Computer notes

The computer notes produced by the students of the intervention group during the inquiry-projects were collected to illustrate students' actual learning activity. The computer notes were collected to a database, which included not only the students' individual contributions of inquiry but also their postings to the collaborative discussion during the inquiry. The database also included teachers' comments to the students, but the analysis of the computer notes concentrated on students' notes. The analysis of the computer notes followed principles of qualitative content analysis (Chi, 1997). The analysis procedure is described in detail in Study I.

4.6 An overview of the data analysis

Both quantitative and qualitative analysis methods were applied according to the research questions and the nature of the data. Qualitative content analysis was used as a basic analysis method for the process oriented interviews and the students' computer notes. The results of the qualitative content analysis were partly quantified and further statistical procedures were carried out. Furthermore, the quantitative analyses were used as a basis for zooming in the qualitative data again, for example in discovering typical cases or distinctive features of the whole data set. As Miles and Huberman (1994) and Yin (1991) suggest, comparisons across the data types and student cases were made in order to discern emerging patterns. Most of the case descriptions illuminated in the work are chosen on the basis of the quantitative explorations.

Table 3 presents a summary of the data collection and data analysis in relation to the articles of this dissertation. Hence, it specifies which data and which types of analyses are reported in the articles. Also the specific descriptions of data analyses are given in the articles.

Table 3. Summary of the data collection and analysis in relation to the articles of this dissertation.

Study	Time	Subjects	Research topic	Data sources	Analysis
Study I	7th and 8th grade	Intervention class	The nature of strategic actions in CSCL	Computer notes and discussions Interviews	Qualitative content analysis
Study II	7th, 8th and 9th grade	Intervention class 8 students from the comparison class	Strategy use in computer supported inquiry-based learning	Interviews	Qualitative content analysis Statistical analysis
Study III	7th, 8th and 9th grade	Intervention class	The interplay of motivational goals and cognitive strategies in CSCL	Interviews	Qualitative content analysis Statistical analysis
Study IV	7th, 8th and 9th grade	Intervention class Comparison class	Motivational goals in self-reports and interviews	CSRL questionnaires Interviews	Qualitative content analysis Statistical analysis

5 An overview of the empirical studies

The current work is comprised of four empirical studies. Articles I and II focus on students' cognitive learning strategies in computer supported collaborative inquiry. Article III discusses the contextual nature of motivation and the interplay of motivational goals and cognitive strategies. Article IV is purely focussed on motivation, namely of the contextual aspects on achievement goals.

5.1 Article I

Salovaara, H., & Järvelä, S. (2003). Students' strategic actions in computer supported collaborative learning. *Learning Environments Research*, 6, 267-285.

The purpose of Article I was to analyse the nature of strategic actions used by secondary school students in three inquiry-based computer supported collaborative learning projects, conducted within two school years. Furthermore, the aim was to recognise typical strategic patterns emerging in students' literature inquiries. The article was initiated by an assumption that is found typically in recent discussions on self-regulated learning (e.g., Pintrich, 2000b): learners' cognitive actions are adjusted according to the learning environment's features and the students' situation specific interpretations. However, there is a lack of research evidence about how this process takes place.

A process-oriented approach for investigating strategies was applied. The analysis aimed at revealing students' situation specific strategies and establishing possible reasons for choosing certain strategies in different phases of the inquiry-learning process. Hence, process-oriented data were collected. It consists of students' computer notes recorded in the databases, and process-oriented interviews conducted during the learning situations.

The results derived from qualitative content analysis of the students' computer notes and interviews indicate that the students' inquiry processes were dominated by surface-level strategic actions, but not exclusively. The interviews indicated that the students were aware of the strategic demands of the inquiry task and also of deeper level and metacognitive strategies. The interviews indicated that the students were conscious of the

strategies in terms of the declarative and procedural knowledge related to them. Accordingly, the students understood the possibilities and challenges of this novel learning situation. Nevertheless, they ended up using mainly surface-level strategies and completing the task rather procedurally. Qualitative elaboration of the students' computer notes revealed that the students engaged in collaborative discussions around the topics of the inquiry and that some of these discussions were strategically planned to deepen the inquiries. The findings of the study suggest that the students adjusted their strategic actions according to the demands of the learning situation. Using collaborative discussion as a strategy in the inquiry task provides an example of how the students took advantage of the possibilities of the learning situation. In sum, the students were aware of the strategic possibilities of the learning situation, but applied only a few deeper level or metacognitive strategies. The domination of a surface-level approach in the students' inquiries may be due to the students' inability to respond to the strategic demands posed by the novel learning situation because of a lack of what Paris et. al. (1983) call conditional knowledge about the strategies. Another explanation may be that the strategic adaptation to inquiry-based learning practices takes time and the effects will be seen after a longer period. It is concluded that students' strategic actions should be studied in longitudinal settings and in natural contexts of learning.

5.2 Article II

Salovaara, H (2004). An Exploration of Students' Strategy Use in Inquiry-Based Computer Supported Collaborative Learning. *Journal of Computer Assisted Learning*, 21, 39-52.

The aim of this study was to investigate students' cognitive self-regulation and use of learning strategies in inquiry-based Computer Supported Collaborative Learning (CSCL). A process-oriented interview framework on cognitive activity, self-regulation and motivation, and a coding category for analyzing cognitive strategies and self-regulation were developed. An intervention group (n=18) participating in CSCL inquiry and a comparison group (n=8) were interviewed several times during the three years of the study. The analysis focused on students' interpretations of cognitive strategies. The coding scheme consists both of theory and data driven categories of cognitive strategies. The results derived from the analysis of 161 interviews were compared between the two groups.

The results indicated differences between the groups and hence evidence that instructional contexts may influence students' strategy use. The students who participated in the inquiry-based activities reported more strategies under the categories of monitoring, creating representations, sharing information and, of course, using the database as an information source. The students of the comparison group reported more strategies under the categories of memorization and content evaluation. Accordingly, the results suggest that inquiry-based activities may enhance deeper-level cognitive activity, because the strategies highlighted in the intervention groups' interviews can be considered as deeper-level strategies. Content evaluation, which was significantly more

reported by the comparison group, provides an exception. This may be due to the more open evaluation practices and reduced teacher control in the experimental classroom. These practices are not in line with conventional practices in Finnish classrooms and hence, when the teacher is not outlining learning content, students' overall picture of what has been learned may remain unclear. Sharing information was characteristic for the intervention group's students. They used sharing information collaboratively as a strategy for promoting their individual cognitive effort and the interview excerpts included an indication of socially shared cognitive regulation. Qualitative exploration of the strategy interpretations indicated further differences between the groups. Interconnections between different strategic activities were discovered particularly in the intervention group's interviews. For example, learning goals were illustrated in conjunction with monitoring by comparing an ongoing phase of inquiry to overall learning goals set before. To conclude, the results of the study illustrated that inquiry-based computer supported collaborative learning can enhance the use of cognitive strategies that support learning.

5.3 Article III

Järvelä, S., & Salovaara, H. (2004). The interplay of motivational goals and cognitive strategies in a new pedagogical culture. *European Psychologist, 9*, 232-244.

This article described the results of an analysis of three years of process-oriented interview data concerning secondary school students' goals and learning strategies in computer supported collaborative inquiries. The aim of the study was to investigate the changes in students' goal interpretations and the situational dynamics of students' goals and strategies over three years. By looking at the ways the secondary school students (N=18) at the age of 13-15 years interpret and explain the different situations in a new pedagogical context, we were able to discover their subjective and context specific explanations. The interview data were analysed by a qualitative content analysis and non-parametric statistics were used to authenticate some of the qualitative findings.

The data showed that the students' interpretations of their mastery, performance, and avoidance goals and strategies vary during different years of the study. Also it was shown that students may even pursue several types of goals within a single learning project. The qualitative analysis resulted in two groups of students; a group of nine students where there was a tendency in students' goal interpretations across the three years and another group of nine students where the students' goal interpretations were incoherent across the period of three years. A non-parametric analysis indicated that when the students reported an avoidance goal, they reported fewer strategies, and when the students reported a mastery goal, they reported more strategies. However, qualitative exploration of the interviewed strategy interpretations showed that there was no difference in the quality of strategies the students used when pursuing different types of goals. Hence, for example, the avoidance goal interpretations were not associated with lower-level strategies, but the strategy interpretations included both deep and surface processing strategies. It can be

concluded that the students seem to develop both individual and contextual goals as well as strategies to self-regulate in the new pedagogical culture.

5.4 Article IV

Salovaara, H., & Järvelä, S. (2004). Longitudinal analysis of motivational goals and self-regulation – Contrasting self-reports and process-oriented interviews. Submitted for publication.

This study explored the contextual nature of students' motivational goals. The recent motivation research, based on achievement goal theory, has distinguished three basic dimensions of motivational goals: mastery, performance, and avoidance. The majority of previous studies on achievement goals have been based on quantitative data in the form of students' self-reports. However, the most recent development of motivation theories emphasises the contextual nature of motivation and state-like nature of goals instead of conceptualising motivation as an individual trait. Consequently, the study adopted a mixed method approach for investigating students' achievement goals. The aim of the study was to gain an understanding of how different types of goals are illustrated in students' contextual interpretations and in different levels (dispositional goal orientation level and in the level of context specific goal interpretations). A self-report questionnaire was administered three times to a group of 18 secondary school students. Repeated process oriented interviews of students' achievement goals were conducted during the three years of the study.

A longitudinal examination of self-reports did not indicate changes in students' achievement goal orientations. The longitudinal examination of the interview data indicated some minor changes. A cross-examination of quantitative self-reports measuring goal orientations and qualitative interview data of the students' task-specific achievement goals indicated incoherency. Particularly in performance and to some extent in avoidance goals, there was a lack of congruence between the self-reported goals and interviewed goal expressions. Avoidance goals especially were infrequently indicated in the interviews when compared to the self-reports. A possible explanation for these findings is that students' self-reported goals do not predict students' situational goal interpretations and, accordingly, students' goal oriented behaviour in the learning context. However, the results suggested that the pedagogical context involving embedded mastery goal structure might explain why the discrepancies were not as strong as that found in mastery goals. From the motivational theory aspect, the results of the study show that different achievement goal concepts work differently in the general orientation level and in the level of authentic learning situations. The article discusses methodological and theoretical implications of this finding in the light of recent development in goal theory and the motivation in context approach.

6 Main findings and general discussion

The aim of the current dissertation research was to study students' achievement goals and cognitive strategies in computer supported collaborative inquiry learning. Anderman and Anderman (2000) present two focal challenges involved in considering context in learning research. The first concerns conceptualization of context and understanding how individuals and situations interact. Identifying this interaction is paramount for constructing a dynamic model of learning, which is needed in explaining how learners are disposed in ever-changing learning situations typical in modern life. This dissertation study underscores the contextual nature of learning by providing theoretical conceptualizations of contextual achievement goals and cognitive learning strategies in context and, furthermore, indicates several empirical examples of contextual learning processes. The second challenge outlined by Anderman and Anderman (2000) involves methodology and urges researchers to develop methods to analyze learning in context. The current dissertation study builds on the more traditional methods used in investigating achievement motivation and self-regulation, but significantly extends the methodology to process-oriented and qualitative approaches. Hence, the study was a mixed-method study. Furthermore, comparisons between a conventional literature class and a class studying literature in a computer supported inquiry based pedagogical context were applied and the methodological design was quasi-experimental.

The purpose of this discussion is to highlight the main empirical findings derived from the study and critically discuss them. Hence, the findings will be discussed under four separate subchapters, each devoted to discussion of one of the major findings. First, the results indicate that both achievement goals and cognitive learning strategies have contextual characteristics. Second, the findings underscore the need to study the interplay of motivational and cognitive processes. Third, it is shown that some of the motivational and cognitive effects of the pedagogical intervention can be seen only after a longer period of time. Fourth, social processes are highlighted in the students' contextual interpretations of their self-regulation. Finally, in the last subchapters, the discussion extends to the methodology of the study and, finally, provides both practical implications and issues for further research.

6.1 Students' motivation and use of cognitive strategies in dynamic contexts of learning

6.1.1 Findings related to cognitive learning strategies in context

Studies I and II indicate that the strategic processes of the students in the CSCL inquiry intervention class accorded well with the learning theoretical background of the intervention. Hence, in Study I, it is shown that the students were aware of the strategic demands of the inquiry task and also of the need to use deeper level and metacognitive strategies. Furthermore, studies I and II indicate that the students adjusted their cognitive learning strategies and self-regulation efforts according to the demands of the learning context at hand. They even came up with novel strategies in order to fulfil the needs of the learning context. The students, for instance, used collaborative computer-based discussion to help solve the specific problems of their inquiries. Although Study I suggests that the students ended up using predominantly surface level strategies, Study II, involving a comparison with the conventional literature class, draws a more positive picture of the strategies of the intervention class. The comparison suggests that the students in the intervention class used mainly more sophisticated strategies in their learning than the students in the conventional literature class. In sum, it seems that strategy use and cognitive self-regulation involves adaptation to the learning context at hand. Returning to the general learning theoretical understanding outlined in the introductory chapter, these results concerning cognitive learning strategies can be explained in light of the ideas of socioconstructivist theory suggesting enculturation as a process leading individuals into inquiry-based learning culture. Hence, students' development in cognitive strategy use and self-regulatory activities would be an adaptive response to the environmental demands set up by the learning context and the surrounding social situation (cf. Paris et al., 2001).

This is not to say that the process would be automatic and fluent. Rather, the results suggest that it is not a straight path but takes time and may include deficiencies. The results of Study II, for example, indicate that the students in the intervention group did not engage in content evaluation as a learning strategy, a result which was reported by the students of the comparison group. Hence, to understand in detail how the interaction between the contextual characteristics and learners' strategic behaviour take place, detailed qualitative information is needed from different types of learning contexts. The results of the current dissertation study can be compared to the ones by DeGroot (2002) as she used the same type of qualitative interview method to study learning strategies but in the context of conventional school tasks. In DeGroot's study the strategies that the students described were related to retaining and understanding information such as paraphrasing, mnemonic strategies, self-testing and self-questioning, note-taking, outlining and asking others for help. If contrasted with the results of the current study, though there were similarities with the interviewed strategy use of the comparison class. However, there are remarkable differences compared to the intervention class studying in inquiry-based computer supported collaborative learning, whose strategies included processes related to elaboration, knowledge transformation, and collaborative knowledge

building. Taken together it seems that the pedagogical context does make a difference in terms of the cognitive learning strategies that learners apply.

It is of paramount importance to note, however, that the linkage between a learning context and an individual behaviour is not straightforward. As already highlighted in the theoretical section, the interpretations the individual learners make play a major role in their achievement behaviour. Concerning inquiry-based learning context and strategy use, it has been suggested that students may have distinct impressions of an inquiry learning task, such as inquiry as an accumulation of information, as transferring information or inquiry as transforming information, and that these impressions may be characterized by differing emphases the students place on the cognitive subtasks of planning, searching, finding, recording, reviewing, and presenting (Many et al., 1996). Furthermore, students' more general conceptions of learning may have effect on how they use learning strategies. For example, students' conception of learning as understanding is associated with a greater total use of strategies (Purdie et al., 1996). These findings can partly explain why the students in the current study applied several types of strategies and why their adjustment of cognitive strategies according to the contextual demands was eclectic.

6.1.2 Findings related to achievement goals in context

In this dissertation study, the findings of the contextual nature of learning are also relevant to motivational achievement goals. The results of Study III indicated that students might even pursue several types of goals within a single learning project. Furthermore, it became evident that a single student's interpretations of goals varied during the different years of the study. Hence, it cannot be concluded that a dispositional goal tendency would have been explicit in all students' goal interpretation throughout the three years of the study. The findings concerning contextual goal interpretations draw a highly dynamic view of achievement goals and, hence, stand for the multiple goals perspective (cf. Linnenbrink & Pintrich, 2001; Pintrich, 2000c).

Also Study IV strongly argues for the importance of recognising the contextual aspect in students' motivation. The findings question the role of general level goal orientations resulting as task-specific achievement goal interpretations. Only unsubstantial congruence was discovered when an individual student's self-reported goal orientations were compared to the student's contextual goal interpretations. Hence, it became evident that it is wrong to make strong assumptions about how students' general level achievement goal orientations become realized in different learning contexts. As this finding is based on the results concerning the intervention group and no comparison was carried out to entangle this aspect, it is impossible to say how the pedagogical intervention that the students of the intervention class participated in, contributed to their task-specific goals. However, considering the theoretical background explaining the classroom contextual effects on motivation, it is conceivable that the pedagogical intervention might have had some effect on the students' task-specific goals since the teacher behaviour, the inquiry task structures and the collaborative practices highlighted task involvement, understanding and mastery.

Another possibility for the discovered incongruence between goal orientation and task-specific goals might be that they are more separate processes and include more elements than is currently assumed. Accordingly, it is evident that more research is needed to explain students' goals in context and, furthermore, to explain the dimensions of goals, which are not covered by the current areas of achievement goal theory. For instance, social goals (cf. Dowson & McInerney, 2003; Vauras et al., 2001) may play a substantive role in students' adoption of task-specific goals.

6.2 Importance of studying and recognising the interplay of cognition and motivation

The results of the current study underscore the necessity of studying the interplay of cognition and motivation. On the basis of previous studies in the field, it is often assumed that certain types of motivational goal orientations generate certain types of achievement behaviour and strategy use (e.g., Ames, 1992; Pintrich & De Groot, 1990). However, the empirical work of the current study revealed that achievement goal patterns did not necessarily generate such cognitive strategy use as could have been expected on the basis of previous findings concerning goals and cognitive strategy use. For example, in article III it was demonstrated that adoption of an avoidance goal was not followed by a non-strategic learning behaviour. Instead, it was discovered that the students whose goal interpretations included avoidance goal used deep cognitive strategies, but the variety of them was narrower than, for example, those students whose interviews had indicated mastery goals. Evidently, as the findings of the current study are based on case-level descriptions, their value is in providing issues for further research, not in making generalizations. Still, these findings challenge the current theoretical thinking concerning achievement goals as generalized patterns resulting in certain types of achievement behaviours, and indicate a need to develop achievement goal theory and theoretical models of self-regulation to take contextual effects into account more emphatically.

The interconnections between cognitive strategy use and achievement goals have mainly been investigated by correlative analyses derived from self-reports, which approach goal orientations and strategic activity related to an individual students' learning behaviour in general. Hence, process-oriented data have potential to display in detail how achievement goals and cognitive strategies interact. For example, in Study II it was demonstrated, by a case-level description, how motivational goals were used as monitoring standards against which cognitive monitoring processes were framed. Thus, these pieces of evidence indicate the overlap of cognitive and motivational activity in learning. Following the idea of Hadwin and Winne (1996), who suggest that any single cognitive strategy is not uniformly effective, it would be valuable to examine the contextual composition of different cognitive strategies that are used by students to address learning goals.

Taken together, a great deal of a learning process is missed if only one aspect involved in it is studied and attention is not paid to the interconnections between different sub-processes of learning such as achievement goals and cognitive learning strategies. This issue is addressed also by Patrick and Middleton (2002) who report that although students

were engaged in cognitive and metacognitive activity, their engagement was directed in large part at following procedures or at more superficial aspects of the task rather than to understanding. Therefore, studying strategy use without considering it in relation to goals might produce a biased view of the phenomena. Or, controversially, studying achievement goals solely may not actually provide any useful information about the students' learning processes.

6.3 A longitudinal perspective on motivational and cognitive effects of the pedagogical intervention

As the study followed the same students for a period of three years, it was possible to see that it takes time to adapt to a new learning environment. Although longitudinal effects were not specifically examined, the results of studies II, III and IV provide some information about the issue. Concerning cognitive strategy use, the findings of Study II drew a more positive picture of students' cognitive strategy use than the findings of Study I. It should be noted that these two studies are not directly comparable as they encompassed different analyses. Furthermore, actual longitudinal comparisons were not carried out. However, as Study I focused on the data from the 7th and 8th grade and Study II to the whole data set from the three years, it may be that the students' cognitive strategy use became even more adapted during the course of participating in repeated CSCL inquiries. Pressley (1995) supports this inference by denoting that learners prefer to use strategies they are familiar with and that it takes time to learn new strategies so that they become applied fluently. Perry et al., (2002) worked with teachers to create high self-regulation classrooms and conducted a two-year qualitative study. Her observations revealed positive effects in the second year of the study, concerning lowered preference for easy tasks, increased positive affect towards errors, and the use of sophisticated learning strategies and study tactics. On the other hand, it may be that there are some developmental effects in students' cognitive processes during secondary school. There is an indication that generally, self-regulation becomes more efficient during adolescence (cf. Weinstein & Mayer, 1986; Zimmerman, 1989; Zimmerman & Martinez-Pons, 1990). Nevertheless, the assumptions concerning longitudinal effects of strategy use seem to be plausible.

The longitudinal findings on motivation indicated that the contextual goal interpretations of the intervention group were multidimensional throughout the three years of the study. In other words, the contextual goal interpretations did not, necessarily, involve a clear tendency and it was typical that the students had several types of goal interpretations. Furthermore there was a lack of convergence between the students self-reported goal orientations contextual goal interpretations. The most intriguing inference concerning these findings is that contextual cues and invoked goal interpretations can appear in individuals' goal orientations in the long run. At a theoretical level, we can think that the dispositional goal orientation framework, which defines how people respond to certain situations, can be affected by exposing learners to situations, which invoke, for example, mastery goals. If these situations repeatedly evoke such goal interpretations, which differ from the dispositional goal orientation of an individual, they

finally can cause changes in the individual's more dispositional goal orientation. Hence, it is evident that a longitudinal research design is needed to study this kind of slow modification process.

6.4 Self-regulation in social contexts of learning

The final main finding of the study considers how social dimension emerge in learning processes. In the study, the issue was particularly addressed by the results concerning cognitive self-regulation and the quality of the learning strategies. In Study II it was found that the students used collaborative discussion as a strategy in their own work. Hence, the results implied that the surrounding pedagogical culture emphasising student collaboration encouraged inventing and applying such strategies.

Traditionally self-regulation and strategic activity have been examined from an intraindividual point of view and the research results in the field are mainly based on this view. If compared to the current socioconstructivist theories of learning, social and contextual dimensions of regulating learning seem to be scarcely considered. There are, however, evolving definitions emphasizing that self-regulation does not occur solely as an individual effort but that it is shaped by social contexts (Meyer & Turner, 2002; Patrick & Middleton, 2002). Students learn in a complex network of relationships of goals, individuals and settings where responsibility for regulating learning is more or less shared within a learning community (McCaslin & Hickey, 2001). McCaslin and Good (1996) have suggested a concept of co-regulation to explain regulation processes that take place within learning communities such as classrooms. According to this view, self-regulation is promoted by co-regulation and both of these processes are meaningful in regulation of learning (McCaslin & Hickey, 2001).

The concept of co-regulation provides a theoretical explanation on how different features of classroom, social relationships, or different embedded goal structures can enhance or hinder students' engagement on a learning task and cognitive self-regulation such as selection of cognitive strategies. Particularly in inquiry-based pedagogical contexts where collaboration is presupposed, regulation of learning should also be considered from a social point of view. This is because it may be anticipated that collaboration and emerging learning communities provide possibilities for novel forms of regulation by enabling different modelling, scaffolding, and co-regulation processes that can interact with a student's individual self-regulation. As pointed out by Boekaerts (1999) the development of self-regulation is not supported by external regulation, for example, on behalf of the teacher. Instead, students need to have possibilities to internalise self-regulation. Thus, co-regulation, which involves monitoring each others' task engagement and actions, contributing ideas, interpretations and conclusions, developing strategic ways to approach problems, promoting conceptual change and sustaining involvement through encouragement and mutual support would be an optimal situation to support development of self-regulatory skills (cf. Patrick & Middleton, 2002). As a whole, the findings of the current study speak for engaging in such theoretical underpinnings, which provide the basis for explaining how the social environment might have an influence on students' motivation and self-regulation.

6.5 Practical implications

Educational psychology is, as pointed out previously, a research field that pursues both theoretical and practical goals. Thus, the current study generates aspects that are useful for developing and considering pedagogical practices. The study indicates that new learning practices have potential to modify student motivation and empower cognitive engagement, but also point out some critical pitfalls.

The results and experiences gathered in the current research project indicated that although it seems to be possible to support meaningful learning, motivation and thinking, various practical efforts are needed. First, the results indicated that designing learning environments based on current knowledge about learning tend to enhance learning and motivation. There have been several successful attempts to promote self-regulated learning for example in reading, writing, and mathematics problem solving (e.g., Graham & Harris, 1994; Palincsar & Brown, 1984). However, there are also contradictory findings regarding the usefulness of strategy interventions, as it is rather unclear whether students apply their skills outside the intervention context (Howard-Rose & Winne, 1993). Hence, it seems to be necessary to attach strategy instruction to a pedagogical context, such as inquiry learning, which implicitly directs students to endorse mastery goals, engage in self-regulated learning, and to use deeper level cognitive strategies. The results of the current study also provide some hints for teachers on how they can support students' efforts to self-regulate and hence, purposefully create practices of co-regulation. Teachers can, for example, foster students' conditional knowledge of strategies and provide scaffolding and support for using cognitive learning strategies, purposefully discuss with students about strategies and invent pedagogical practices to make effective self-regulation visible for the students.

Second, it was discovered that self-regulatory skills do not develop within the short term. Furthermore, although the analysis of the current study could not establish that the students' enculturation to conventional and traditional school practices hindered the effects of the novel pedagogical practice, this kind of impression was particularly strong during the fieldwork (cf. Hakkarainen et al., 1998). Therefore, it is suggested that development of self-regulatory skills should be embedded in curricula and carry over studies. This would also give time to foster students' epistemological understanding related to the nature of learning as understanding and personal involvement, and enculturation to social knowledge building practices.

Third, the study points out the need to consider why we want students to learn. Do we want them to achieve as much as possible or do we want to foster the development of their intellectual and social skills? These questions are related to the motivational structures that schooling practices essentially involve. The critique presented by Kaplan and Middleton (2002) is particularly concerned with revised goal theory, highlighting the fact that performance-approach goals are associated with positive outcomes (academic achievement) and questions the necessity of students striving for good grades. The arguments underscore the essence of mastery goals as representing and enhancing meaningful learning. In this study, the motivational emphasis of the pedagogical practices was in mastery goals. Accordingly, the results were encouraging in terms of the possibility of supporting mastery orientation and of providing motivational "options" for

those students endorsing other types of goals. The study, in addition, bolsters the point made by Kaplan and Middleton, by indicating the remote nature of performance goals in this type of pedagogical context.

The fourth practical concern raised in the work is related to dissemination of the novel pedagogical practices. Following the spirit of design based research, the aim of the current study was to implement new pedagogical practices in classrooms. However, it is becoming evident that the resources of schools for making pedagogical changes are rather restricted. Interventions such as those highlighted in the current study are too often seen as extra curricular activities, and school authorities do not necessarily commit to supporting them. For this kind of practice to be disseminated in schools, they need to be supported by school authorities, embedded in school curricula with adequate resources and support given to teachers (cf. Perry, 1998). Despite these several challenges, there are also an increasing quantity of empirical knowledge and means, such as virtual communities, to support the dissemination efforts.

6.6 Methodological restrictions and implications for further research

Even though the results of this dissertation study add to the recent understanding of how achievement goals and cognitive learning strategies function within a learning context, there are a number of limitations, which need to be considered. First, the generalizability of the results is limited due to the small number of subjects. The data is derived from an intensive qualitative study of the intervention group throughout the three years. Focussing on a few subjects is typical in qualitative research (e.g., Yin, 1991), and frequent individual student interviews within authentic classroom contexts would not have been possible to undertake with a large group of students. Hence, through this data it was possible to enter students' individual contextual interpretations of their achievement goals and cognitive processes. By following the targeted group of students intensively, the study generated results that would not have been discovered otherwise. However, replications and extensions of this work are needed to extend the generalizability of the findings.

Second, although the analysis involved some between-group and some longitudinal comparisons, even more of them could have been carried out to bolster the findings. The data, which were collected from the comparison group studying in a conventional classroom setting, was not as comprehensive as the data from the intervention class. These deficiencies set some restrictions on the comparisons between the two student groups. Furthermore, there would have been more possibilities to engage in studying longitudinally, for example, the strategy use of the intervention group. The small number of subjects also made the comparisons technically difficult as there are only limited possibilities to conduct comparisons with data, which do not qualify for most of the statistical analyses. Hence it is particularly important to note that the statistical procedures were not applied to detect any findings to be generalized, but to help in focussing on important aspects of the qualitative data. Nevertheless, the design of the study involving both the longitudinal aspect and a comparison group generated valuable insight on the issues under investigation.

The third aspect involves the potential of the interview data in studying students' strategies and the specificity of the qualitative content analysis of the interviews. A focused reader may discover that different analyses of cognitive learning strategies have been applied in Study I and Study II. In Study I cognitive learning strategies were analysed at a general level as the aim was to apply a rather general categories of strategies (deep, surface and metacognitive strategies), which had a great deal of explanatory power and were rather conveniently operationalized. However, it was noted that this kind of classification did not create a detailed framework for seeing what kind of strategic processes the students actually described in the interviews. Hence, a more detailed category for the qualitative content analysis of students' strategies was created and applied in studies II and III. Another, yet related, topic is the usefulness of interview data to trace the actual learning strategies students use. More detailed data, such as trace data (Winne, Jamieson-Noel & Muis, 2002) or think-aloud methods describing cognitive learning strategies within learning situations would provide more authentic information of the issue. A comparison between observed learning strategies and students' own interpretations of their strategic actions might explain more specifically how cognitive learning strategies are applied in context (cf. Perry, 2002).

The fourth limitation of the study is related to the mixed method approach. Although several insights were gained by using this kind of approach, great difficulties were faced in attempts to combine data stemming from two different methodological traditions. Initially, the aim of the study was to focus on highly qualitative, process-oriented data which enable the observer to discern an individual student's thoughts and interpretations of motivational and cognitive processes. However, it was noted that a linkage to mainstream research on motivation and self-regulation utilizing quantitative methods would provide us with a basis to interpret the qualitative data. Accordingly, some theoretical aspects of achievement goal constructs were raised (for a detailed discussion on the issue see Study IV). The same potential of mixed method analyses was noted by Howard-Rose and Winne (1993) who discovered incoherency in self-regulated learning measures by using mixed-method analyses. They explained the incoherency by denoting that students had quite different referents of "school learning situations in general" and "this particular task". In the current dissertation study the discovered incoherency may be due to the same phenomena as the quantitative self-report measures addressed to the students in terms of school learning situations in general and the qualitative interviews in terms of the inquiry-based learning tasks. Another cause for the incoherency may be students' biased views of their learning (cf. Winne & Jamieson-Noel, 2002). Nevertheless, the attempt to use different types of data in parallel was valuable in terms of triangulation, providing complementarity to examine different facets and initiation to recognise paradoxes (cf. Turner, 1995; DeGroot, 2002). Nevertheless, more work needs to be done to develop valid ways to combine different methods.

To sum up the methodological considerations, a few more words about the meaning of generalizing from the perspective of design-based research need to be said. Barab and Squire (2004) denote that "design based research requires more than understanding the happening of one particular context, but also requires showing the relevance on the findings derived from the context of intervention to other contexts." In this study the intention was to explicate and discuss the findings generated from the undertaken intervention with enough precision to provide a basis for the reader to discern the

potentials and limits of "the petit generalizations" (cf. Stake, 1995) that might be done on the basis of the study representing one type of design-based research.

To conclude, it is hoped that the findings of this dissertation study truly speak for the importance of considering motivational and cognitive aspects of learning jointly and, furthermore, of taking the contexts of learning into account both theoretically and empirically.

References

- Alexander, P.A. (1995). Superimposing a situation-specific and domain specific perspective on an account of self-regulated learning. *Educational Psychologist*, 30, 189-193.
- Alexander, P.A. (1997). Mapping the multidimensional nature of domain learning.: the interplay of cognitive, motivational and strategic forces. In M.L. Maehr & P.R. Pintrich, (Eds.), *Advances in motivation and achievement* (Vol. 10 pp. 213-250). Greenwich, CT: JAI Press.
- Alexander, P.A., Schallert, D.A., & Hare, V.C. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of Educational Research*, 61(3), 315-343.
- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84, 261-271.
- Ames, R., & Ames, C. (1989). Introduction. In C. Ames & R. Ames (Eds.), *Research on motivation in education. Goals and Cognitions*. (Vol. 3 pp. 1-10). San Diego: Academic Press.
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Goals, structures, and student motivation. *Journal of Educational Psychology*, 80, 260-267.
- Anderman, L.H., & Anderman, E.M. (2000). Considering contexts in educational psychology: Introduction to the special issue. *Educational Psychologist*, 35, 67-68.
- Anderman, E.M., & Young, A.J. (1994). Motivation and strategy use in science: Individual differences and classroom effects. *Journal of Research in Science Teaching*, 31, 811-831.
- Anderson, J.R., Greeno, J.G., Reder, L.M., & Simon, H.A. (2000). Perspectives on learning, thinking, and activity. *Educational Researcher*, 29, 11-13.
- Azevedo, R., Cromley, J.G., & Seibert, D. (2004). Does adaptive scaffolding facilitate students' ability to regulate their learning with hypermedia? *Contemporary Educational Psychology*, 29, 344-370.
- Azevedo, R., Ragan, S., Cromley, J.G., & Pritchett, S. (2002). *Do different goal-setting conditions facilitate students' ability to regulated their learning of complex science topics with RiverWeb?* Paper presented at the annual conference of the Americal Educational Research Association, New Orleans, LA, April 1st-5th 2002.
- Barab, S.A., Hay, K.E., & Yamagata-Lynch, L.C. (2001). Constructing networks of action-relevant episodes: An in situ research methodology. *The Journal of Learning Sciences*, 10, 63-112.
- Barab, S., & Squire, K. (2004). Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, 13, 1-14.
- Blumenfeld, P.C. (1992). Classroom learning and motivation: Clarifying and expanding goal theory. *Journal of Educational Psychology*, 84, 272-281.
- Boekaerts, M. (1996). Self-regulated learning at the junction of cognitive and motivation. *European Psychologist*, 1, 100-112.
- Boekaerts, M. (1999). Self-regulated learning: where we are today. *International Journal of Educational Research*, 31, 445-457.
- Boekaerts, M. (2001). Context sensitivity: Activated motivational beliefs, current concerns and emotional arousal. In S. Volet & S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp.17-31). London: Elsevier.

- Boekaerts, M., & Niemivirta, M. (2000). Self-regulated learning. Finding a balance between learning goals and ego-protective goals. In M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 417-450). San Diego, CA: Academic Press.
- Boekaerts, M., Pintrich, P.R., & Zeidner, M. (2000). (Eds.) *Handbook of Self-Regulation*. San Diego, CA: Academic Press.
- Bong, M., (1996). Problems in academic motivation research and advantages and disadvantages of their solutions. *Contemporary Educational Psychology*, 21, 149-165.
- Bouffard, T., Boisvert, J., Vezeau, C., & Larouche, C. (1995). The impact of goals orientation on self-regulation and performance among college students. *British Journal of Educational Psychology*, 65, 317-329.
- Bransford, J., Brown, A., & Cocking, R. (1999). *How people learn: Brain, mind and, experience, and school*. Washington, D.C: National Academy Press.
- Brown, A.L. (1992). Design Experiments: Theoretical and methodological challenges in creating complex intervention in classroom settings. *The Journal of the Learning Sciences*, 2, 141-178.
- Butler, D.L. (2002). Qualitative approaches to investigating self-regulated learning: contributions and challenges. *Educational Psychologist*, 37, 59-63.
- Butler, D.L., & Winne, P.H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 65, 245-281.
- Campione, C.J., & Brown, A.L. (1990). Guided learning and transfer: Implications for approaches to assessment. In N. Frederiksen, R. Glaser, A. Lesgold, & M.G. Shafto (Eds.), *Diagnostic monitoring of skill and knowledge acquisition* (pp. 141-172). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chandler, P., & Sweller, J. (1991). Cognitive load theory and the format of instruction. *Cognition and Instruction*, 8, 293-332.
- Chi, M.T.H. (1997). Quantifying qualitative analyses of verbal data: A practical guide. *Journal of the Learning Sciences*, 6, 271-315.
- Chi, M.T.H., Bassok, M., Reimann, P., & Glaser, R. (1989). Self-explanations: How students study and use examples in learning to solve problems. *Cognitive Science*, 13, 145-182.
- Cobb, P., Confrey, J., diSessa, A., Lehrer, R., & Shauble, L. (2003). Design experiments in educational research. *Educational Researcher*, 32, 9-13.
- Cohen, A., & Scardamalia, M. (1998). Discourse about ideas: Monitoring and regulation in face-to-face and computer-mediated environments. *Interactive Learning Environments*, 6, 93-113.
- Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *The Journal of the Learning Sciences*, 13, 15-42.
- Corno, L. (1993). The best-laid plans: Modern conceptions of volition and educational research. *Educational researcher*, 22, 14-22.
- Corno, L. (2001). Volitional aspects of self-regulated learning. In B. Zimmerman & D. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 191-225). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Corno, L., & Mandinach, E.B. (1983). The role of cognitive engagement in classroom learning and motivation. *Educational Psychologist*, 18, 88-108.
- Covington, M.V. (2000). Goal theory, motivation and school achievement: An integrative review. *Annual Review of Psychology*, 51, 171-200.
- Creswell, J.W. (2003). *Research design: Qualitative, quantitative and mixed methods approaches*. 2nd edition. Thousand Oaks: Sage Publications.
- Deci, E.L., & Ryan, R.M. (1996). Need satisfaction and the self-regulation of learning. *Learning and individual differences*, 8, 165-184.
- De Corte, E. (2003). Designing learning environments that foster the productive use of acquired knowledge and skills. In E. De Corte, L. Verschaffel, N. Entwistle, & J. Van Merriënboer (Eds.), *Powerful learning environments: Unravelling basic components and dimensions* (pp. 21-33). Amsterdam: Pergamont.
- De Corte, E., Verschaffel, L., Entwistle, N., & Van Merriënboer, J. (Eds.) (2003). *Powerful learning environments: Unravelling basic components and dimensions*. London: Elsevier.
- De Groot, E.V. (2002). Learning through interviewing: Students and teachers talk about learning and schooling. *Educational Psychologist*, 37, 41-52.

- Derry, S.J., & Murphy, D.A. (1986). Designing systems that train learning ability: From theory to practice. *Review of Educational Research*, 56, 1-39.
- The Design-Based Research Collective (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, 32, 5-8.
- Dowson, M., & McInerney, D.M. (2003). What do students say about their motivational goals?: Towards a more complex and dynamic perspective on student motivation. *Contemporary Educational Psychology*, 28, 91-113.
- Duda, J.L., & Nicholls, J.G. (1992). Dimensions of academic motivation in schoolwork and sport. *Journal of Educational Psychology*, 84, 290-299.
- Dweck, C.S. (1986). Motivational processes affecting learning. *American Psychologist*, 41, 1040-1048.
- Dweck, C., & Leggett, E. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256-273.
- Elliot, A.J. (1997). Integrating the "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. In M. Maehr & P. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp.243-279). Greenwich, CT: JAI Press.
- Elliot, A.J., (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34, 169-189.
- Elliot, A.J., & Harackiewicz, J.M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, 70, 461-475.
- Elliot, A.J., McGregor, H.A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology*, 91, 549-563.
- Elliott, E.S., & Dweck, C.S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, 54, 5-12.
- Entwistle, N. (1988). Motivational factors in students' approaches to learning. In R. Schmeck (Ed.), *Learning strategies and learning styles: Perspectives on individual differences* (pp.21-51). New York: Plenum Press.
- Garner, R., & Alexander, P.A. (1989). Metacognition: Answered and unanswered questions. *Educational Psychologist*, 24, 143-148.
- Goldman, S.R. (1997). Learning from text: Reflections on the past and suggestions for the future. *Discourse Processes*, 23, 357-398.
- Graham, S. & Golan, S. (1991). Motivational influences on cognition: Task involvement, ego involvement, and depth of information processing. *Journal of Educational Psychology*, 82, 187-194.
- Graham, S., & Harris, K.R. (1994). The role and development of self-regulation in the writing process. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 203-228). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Hadwin, A.F., & Winne, P.H. (1996). Study strategies have meager support. A review with recommendations for implementation. *Journal of Higher Education*, 67, 692-715.
- Hadwin, A.F., Winne, P.H., Stockley, D.B., Nesbit, J.C., & Woszczyzna, C. (2001). Context moderates learners' self-reports about how they study. *Journal of Educational Psychology*, 93, 477-487.
- Hakkarainen, K., Järvelä, S., Lipponen, L., & Lehtinen, E. (1998). Culture of collaboration in computer-supported learning: A Finnish perspective. *Journal of Interactive Learning Research*, 9, 271-288.
- Hakkarainen, K., & Sintonen, M. (2002). Interrogative Model of Inquiry and Computer-Supported Collaborative Learning. *Science & Education*, 11 (1), 24-43.
- Hamman, D., Berthelot, J., Saia, J., & Crowley, E. (2000). Teachers' coaching of learning and its relation to students' strategic learning. *Journal of Educational Psychology*, 92, 342-348.
- Harackiewicz, J.M., Barron, K.E., & Elliot, A.J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educational Psychologist*, 33, 1-21.

- Harackiewicz, J.M., Barron, K.E., Pintrich, P.R., Elliot, A.J., & Thrash, T.M. (2002). Revision of achievement goal theory: Necessary and illuminating. *Journal of Educational Psychology*, 94, 638-645.
- Harackiewicz, J.M., Barron, K.E., Tauer, J.M., & Elliot, A.J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measurements as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology*, 94, 562-575.
- Harris, K.R., & Graham, S. (1996). *Making the writing process work: Strategies for composition and self-regulation*. Cambridge, MA: Brookline Books.
- Hartley, K., & Bendixen, L.D. (2001). Educational research in the internet age: Examining the role of individual characteristics. *Educational Researcher*, 30, 22-26.
- Hickey, D.T. (1997). Motivation and contemporary socio-constructivist instructional perspectives. *Educational Psychologist*, 32, 175-193.
- Hickey, D.T., & McCaslin, M. (2001). A comparative, sociocultural analysis of context and motivation. In S. Volet & S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp.33-55). London: Elsevier.
- Higgins, E.T. (1990). Personality, social psychology, and person-situation relations: Standards, and knowledge activations as a common language. In L.A. Pervin (Ed.), *Handbook of personality: Theory and research*. New York: Guilford.
- Howard-Rose, D., & Winne, P.H. (1993). Measuring component and sets of cognitive processes in self-regulated learning. *Journal of Educational Psychology*, 85, 591-604.
- Jagacinski, C., & Nicholls, J.G. (1987). Competence and affect in task involvement and ego involvement: The impact of social comparison information. *Journal of Educational Psychology*, 79, 107-114.
- Järvelä, S. (1996). *Cognitive apprenticeship model in a complex technology-based learning environment: Socioemotional processes in learning interaction*. Doctoral Dissertation. Publications in Education no. 30, University of Joensuu, Joensuu, Finland.
- Järvelä, S., & Niemivirta, M. (2001). Motivation in context: challenges and possibilities in studying the role of motivation in new pedagogical cultures. In S. Volet and S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp.105-127). London: Elsevier.
- Kanfer, R., & Ackerman, P.L. (1989). Motivation and cognitive abilities: An integrative/ aptitude treatment interaction approach to skill acquisition. *Journal of Applied Psychology*, 74, 657-690.
- Kanfer, R., & Ackerman, P.L. (1996). Motivational skills & self-regulation for learning: A trait perspective. *Learning & Individual Differences*, 8, 185-210.
- Kanfer, R., & Ackerman, P.L. (2000). Individual differences in work motivation: Further explorations of a trait framework. *Applied Psychology: An International Review*, 49, 470-482.
- Kaplan, A., & Middleton, M. J. (2002). Should childhood be a journey or a race? A response to Harackiewicz et al. (2002). *Journal of Educational Psychology*, 94, 646-648.
- Koschmann, T. (1996). (Ed.) *CSCL: theory and practice of an emerging paradigm*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Koschmann, T., Hall, R., & Miyake, N. (2001). (Eds.) *CSCL 2. Carrying forward the conversation*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Kruglanski, A.W. (1996). Goals as knowledge structures. In P.M. Gollwizer & J.A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behaviour*. (pp. 599-618). New York: Guilford.
- Lazarus, R.S., & Smith, C.A. (1988). Knowledge and appraisal in the cognition-emotion relationship. *Cognition and Emotion*, 2, 281-300.
- Lemos, M.S. (1999). Students' goals and self-regulation in the classroom. *International Journal of Educational Research*, 31, 471-485.
- Lewalter, D. (2003). Cognitive strategies for learning from static and dynamic visuals. *Learning and Instruction*, 13, 177-189.
- Linn, M.C., Bell, P., & Hsi, S. (1998). Lifelong learning on the Internet: The knowledge integration environment. *Interactive Learning Environments*, 6, 4-38.

- Linnenbrink, E.A., & Pintrich, P.R. (2001). Multiple goals, multiple contexts: the dynamic interplay between personal goals and contextual goal stresses. In S. Volet & S. Järvelä (Eds.), *Motivation in learning contexts theoretical and methodological implications*. (pp 251-269). Amsterdam: Pergamon Press.
- Many, J.E., Fyfe, R., Lewis, G., & Mitchell, E. (1996). Traversing the topical landscape: Exploring students' self-directed reading-writing-research process. *Reading Research Quarterly*, 31, 12-35.
- Mayer, R.E. (1988). Learning strategies: An overview. In C.E. Weinstein, E.T. Goetz, & P.A. Alexander (Eds.), *Learning and study strategies: Issues in assessment, instruction, and evaluation* (pp. 11-22). San Diego, CA: Academic Press.
- Mayer, R.E. (2001). What good is educational psychology? The case of cognition and instruction. *Educational Psychologist*, 36, 83-88.
- McCaslin, M., & Good, T. (1996). The informal curriculum. In D. Berliner & R. Calfee (Eds.), *Handbook of Educational Psychology* (pp. 622-673). New York: Macmillan.
- McCaslin, M., & Hickey, D. (2001). Self-regulated learning and academic achievement: A Vygotskian view. In B.J. Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement. Theoretical perspectives* (pp. 227-252). Mahwah, NJ: Lawrence Erlbaum Associates.
- Meece, J.L. (1991). The classroom context and students' motivational goals. In M. Maehr & P. Pintrich (Eds.), *Advances in motivation and achievement*. Vol. 7 (pp. 261-286). Greenwich, CT: JAI.
- Meece, J.L., Blumenfeld, P.C., & Hoyle, R.H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology*, 80, 514-523.
- Meyer, D.K., & Turner, J.C. (2002). Using instructional discourse analysis to study the scaffolding to student self-regulation. *Educational Psychologist*, 37, 17-25.
- Meyer, D.K., Turner, J.C., & Spencer, C.A. (1997). Challenge in a mathematics classroom: Students' motivation and strategies in project-based learning. *Elementary School Journal*, 97, 501-521.
- Middleton, M., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An under-explored aspect of goal theory. *Journal of Educational Psychology*, 89, 710-718.
- Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology*, 93, 77-86.
- Middleton, C., Maehr, M.L., Hicks, L., Roeser, R., Urdan, T., Anderman, E.M., & Kaplan, A. (1996). *The patterns of adaptive learning survey (PALS)*. Ann Arbor: University of Michigan.
- Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis: A sourcebook of new methods* (2nd ed.) Newbury Park, CA: Sage.
- Nicholls, J.G. (1983). Conceptions of ability and achievement motivation: A theory and its implications for education. In Paris, S.G. & Stevenson, H.W. (Eds.), *Learning and Motivation in the Classrooms*. (pp. 211-237). Hillsdale, NJ: Erlbaum.
- Nicholls, J.G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 92, 328-346.
- Nicholls, J.G., Patashnick, M., & Nolen, S.B. (1985). Adolescents' theories of education. *Journal of Educational Psychology*, 77, 683-692.
- Nicholls, J.G., Cheung, P.C., Lauer, J., & Patashnick, M. (1989). Individual differences in academic motivation: Perceived ability, goals, beliefs, and values. *Learning and Individual Differences*, 1, 63-84.
- Niemivirta, M. (1998). Individual differences in motivational and cognitive factors affecting self-regulated learning – A pattern-oriented approach. In P. Nieninger, R.S. Jäger, A. Frey, & M. Woznitza (Eds.), *Advances in motivation* (pp. 23-42). Landau: Verlag Empirische Pädagogik.
- Niemivirta, M. (2002). Motivation and performance in context - The influence of goal orientations and instructional setting on situational appraisals and task performance. *Psychologia*, 45, 249-269.
- Nolen, S.B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction*, 5, 269-287.

- Palincsar, A.S., & Brown, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1, 117-175.
- Pape, S.J., & Wang, C. (2003). Middle school children's strategic behaviour: Classification and relation to academic achievement and mathematical problem solving. *Instructional Science*, 31, 419-449.
- Paris, S.G., Byrnes, J.P., & Paris, A.H. (2001). Constructing theories, identities, and actions of self-regulated learners. In B.J. Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement. Theoretical perspectives*. Mahwah, NJ: LEA.
- Paris, S.G., Lipson, M.J., Wixon, K.K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology*, 8, 293-316.
- Paris, S.G., & Paris, A.H. (2001). Classroom applications of research in self-regulated learning. *Educational Psychologist*, 36, 89-101.
- Paris, S.G., Wasik, B.A., & Turner, J.C. (1991). The development of strategic readers. In R. Barr, M. Kamil, P. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (2nd ed., pp.609-640). New York: Longman.
- Patrick, H., & Middleton, M.J. (2002). Turning the kaleidoscope: What we see when self-regulated learning is viewed with a qualitative lens. *Educational Psychologist*, 37, 27-39.
- Patrick, H., Anderman, L.H., Ryan, A.M., Edelin, K.C., & Midgley, C. (2001). Teachers' communication of goal orientations in four fifth-grade classrooms. *The Elementary School Journal*, 102, 35-58.
- Patrick, H., Anderman, L.H., & Ryan, A.M. (2002). Social motivation and the classroom social environment. In C. Midgley (Ed.), *Goals, goal structures, and patterns of Adaptive Learning* (pp. 85-108). Mahwah, NJ: Lawrence Erlbaum Associates.
- Pea, R.D. (1993). Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), *Distributed cognitions. Psychological and educational considerations* (pp. 47-87). Cambridge: Cambridge University Press.
- Pea, R., Tinker, R., Linn, M., Means, B., Bransford, J., Roschelle, J., Hsi, S., Brophy, S., & Songer, N. (1999). Toward a learning technologies knowledge network. *Educational Technology Research and Development*, 47, 19-38.
- Pekrun, R., Goetz, T., Titz, W., & Perry, R.P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, 37, 91-105.
- Perry, N.E. (1998). Young children's self-regulated learning and contexts that support it. *Journal of Educational Psychology*, 90, 715-729.
- Perry, N. (2002). Introduction: Using qualitative methods to enrich understandings of self-regulated learning. *Educational Psychologist*, 37, 1-3.
- Perry, N.E., & VandeKamp, K.J.O. (2000). Creating classroom contexts that support young children's development of self-regulated learning. *International Journal of Educational Research*, 33, 821-843.
- Perry, N.P., VandeKamp, K.O., Mercer, L.K., & Nordby, C.N. (2002). Investigating teacher-student interactions that foster self-regulated learning. *Educational Psychologist*, 37, 5-15.
- Pintrich, P.R. (2000a). Educational Psychology at the Millennium: A look back and a look forward. *Educational Psychologist*, 35, 221-226.
- Pintrich, P.R. (2000b). The role of goal orientation in self-regulated learning. In M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation*. (pp.451-502). San Diego: Academic Press.
- Pintrich, P.R. (2000c). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, 92, 544-555.
- Pintrich, P.R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 4, 667-686.
- Pintrich, P.R., Brown, D.R., & Weinstein, C.E. (1990) (Eds.) *Student motivation, cognition and learning. Essays in honor of Wilbert J. McKeachie*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Pintrich P.R., & De Groot, E.V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33-40.

- Pintrich, P.R., & Garcia, T. (1991). Student goal orientation and self-regulation in the college classroom. In M.L. Maehr & P.R. Pintrich (Eds.), *Advances in motivation and achievement: Goals and self-regulatory processes* (pp. 371-402). Greenwich, CT: JAI Press.
- Pintrich, P.R., & Garcia, T. (1994). Self-regulated learning in college students: Knowledge, strategies, and motivation. In P. Pintrich, D.Brown & C. Weinstein (Eds.), *Student motivation, cognition, and learning* (pp. 113-133). Hillsdale, NJ: Erlbaum.
- Pintrich, P.R., Marx, R.W., & Boyle, R.A. (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research*, 63(2), 167-199.
- Pintrich, P.R., & Roeser, R.W. (1994). Classroom and individual differences in early adolescents' motivation and self-regulated learning. *Journal of Early Adolescence*, 14, 139-162.
- Pintrich, P.R., & Schrauben, B., (1992). Students' motivational beliefs and their cognitive engagement on classroom tasks. In D.H. Schunk & J. Meece, (Eds.), *Students perceptions in the classroom: Causes and consequences* (pp.149-183). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Pintrich, P.R., & Schunk, D.H. (1996). *Motivation in education: Theory, research, and applications*. Englewood Cliffs, NJ: Prentice Hall.
- Pintrich, P.R., Smith, D.A.F., Garcia, T., & McKeachie, W.J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement*, 53, 801-813.
- Pressley, M. (1995). More about the development of self-regulation: Complex, long-term, and thoroughly social. *Educational Psychologist*, 30, 207-212.
- Pressley, M., & Afflerbach, P. (1995). Verbal protocols of reading: *The nature of constructively responsive reading*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Pressley, M. & McCormick, C.B. (1995). *Advanced educational psychology for educators, researchers and policymakers*. New York: Harper Collins College Publishers.
- Pressley, M., Harris, K.R., & Marks, M.B. (1992). But good strategy instructors are constructivists! *Educational Psychology Review*, 4, 1-32.
- Purdie, N., Hattie, J., & Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: A cross-cultural comparison. *Journal of Educational Psychology*, 88, 87-100.
- Radosevich, D.J., Vaidyanathan, V.T., Yeo, S., & Radosevich, D.M. (2004). Relating goal orientation to self-regulatory processes: A longitudinal field test. *Contemporary Educational Psychology*, 29, 207-229.
- Rahikainen, M, Järvelä, S. & Salovaara, H. (2000). Motivational Processes in CSILE-based Learning. In *Proceedings of the International Conference for Learning Sciences*, June 14-17, Michigan, USA. Mahwah: Lawrence Erlbaum Associates.
- Roschelle, J., & Pea, R., (1999). Trajectories from today's WWW to a Powerful Educational Infrastructure. *Educational Researcher*, 28, 22-25.
- Ryan, R.M., & Grolnick, W.S. (1986). Origins and pawns in the classroom: Self-reports and projective assessments of individual differences in children's perceptions. *Journal of personality and social psychology*, 50, 550-558
- Ryan, A.M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal*, 38, 437-460.
- Salomon, G. (1991). Transcending the qualitative – quantitative debate: The analytic and systemic approaches to educational research. *Educational Researcher*, 20, 10-18.
- Sansone, C., & Harackiewicz, J.M. (2000). *Intrinsic and Extrinsic Motivation: The Search for Optimal Motivation and Performance*. San Diego, CA: Academic Press.
- Scardamalia, M., & Bereiter, C. (1986). Written composition. In M. Wittrock (Ed.), *Handbook of research on teaching*. (3rd ed., pp.778-803). New York: MacMillan.
- Scardamalia, M., & Bereiter, C. (1993). Technologies for knowledge-building discourse. *Communications of the ACM*, 36(5), 37-41.
- Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge building communities. *The Journal of the Learning Sciences*, 1, 37-68.

- Schunk, D.H. (1994). Self-regulation of self-efficacy and attributions in academic settings. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 75-99). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Schunk, D.H. (1995). Inherent details of self-regulated learning include student perceptions. *Educational Psychologist*, 30, 213-216.
- Schunk, D.H. (2001). Social cognitive theory and self-regulated learning. In B. Zimmerman & D. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 125-152). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Schunk, D.H., & Zimmerman, B.J. (1994). (Eds.), *Self-regulation of learning and performance: Issues and educational applications*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Schunk, D.H., & Zimmerman, B.J. (1997). Social origins of self-regulatory competence. *Educational Psychologist*, 32, 195-208.
- Schneider, W., & Weinert, F.E. (1990). The role of knowledge, strategies, and aptitudes in cognitive performance: concluding comments. In W. Schneider & F.E. Weinert (Eds.), *Interactions among aptitudes, strategies, and knowledge in cognitive performance* (pp. 286-302). New York: Springer-Verlag.
- Schoenfeld, A. (1992). Learning to think mathematically: Problem solving, metacognition and sense making in mathematics. In D. Grouws (Ed.), *Handbook of research on mathematics teaching and learning. A project of the National Council of Teaching Mathematics* (pp. 334-370). New York: Macmillan.
- Seegers, G., & Boekaerts, M. (1993). Task motivation and mathematics achievement in actual task situations. *Learning and Instruction*, 3, 133-150.
- Silva, T., & Nicholls, J.G. (1993). College students as writing theorists: Goals and beliefs about the causes of success. *Contemporary Educational Psychology*, 18, 1-13.
- Stake, R.E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.
- Stokes, D. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Washington, DC: Brookings Institute.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology. Combining qualitative and quantitative approaches*. Thousand Oaks, SAGE Publications.
- Turner, J.C. (1995). The influence of classroom contexts on young children's motivation for literacy. *Reading Research Quarterly*, 30, 410-441.
- Turner, J.C. (2001). Using context to enrich and challenge our understanding of motivational theory. In S. Volet and S. Järvelä (Eds.), *Motivation in learning contexts: Theoretical advances and methodological implications* (pp.85-104). London: Elsevier.
- Turner, J.C., Meyer, D.K., Midgley, C., & Patrick, H. (2003). Teacher discourse and sixth graders' reported affect and achievement behaviours in two high-mastery/high-performance mathematics classrooms. *Elementary School Journal*, 103, 357-384.
- Turner, J.C., Midgley, C., Meyer, D.K., Gheen, M., Anderman, E.M., Kang, Y., & Patrick, H. (2002). The classroom environment and students' reports of avoidance strategies in mathematics: A multimethod study. *Journal of Educational Psychology*, 94, 88-106.
- Urduan, T. (1997). Achievement goal theory: Past results, future directions. In P.R. Pintrich & M.L. Maehr (Eds.), *Advances in motivation and achievement*. Vol. 10 (pp.99-142). Greenwich, CN: JAI Press.
- Urduan, T., Kneisel, L., & Mason, V. (1999). The effect of particular instructional practices on student motivation: An exploration of teachers' and students' perceptions. In T. Urduan (Ed.), *Advances in motivation and achievement*, Vol. 11 (pp. 123-158). Stamford, CT: JAI Press.
- Urduan, T., & Midgley, C. (2003). Changes in the perceived classroom goal structure and pattern of adaptive learning during early adolescence. *Contemporary Educational Psychology*, 28, 524-551.
- Urduan, T., & Turner, J.C. (2005, in press). *Competence motivation in the classrooms*.
- Vauras, M., Iiskala, T., Kajamies, A., Kinnunen, R., & Lehtinen, E. (2003). Shared regulation and motivation of collaborating peers: a case analysis. *Psychologia*, 46, 19-37.
- Vauras, M., Salonen, P., Lehtinen, E., & Lepola, J. (2001). Long-term development of motivation and cognition in family and school contexts. In S. Volet & S. Järvelä (Eds.), *Motivation in*

- learning contexts theoretical and methodological implications.* (pp 295-315). Amsterdam: Pergamon Press.
- Volet, S., & Järvelä, S. (2001). *Motivation in learning contexts: Theoretical advances and methodological implications.* Amsterdam: Elsevier Science.
- Wade, S.E., Trathen, W., & Schraw, G. (1990). An analysis of spontaneous study strategies. *Reading Research Quarterly*, 25, 147-165.
- Weinstein, C.E. (1996). Self-regulation: A commentary on directions for future research. *Learning and Individual Differences*, 8, 269-275.
- Weinstein, C.E., Husman, J., & Dierking, D.R. (2000). Self-regulation interventions with a focus on learning strategies. In M. Boekaerts, P.R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp.727-747). Orlando, FL: Academic.
- Weinstein, C.E., & Mayer, R.E. (1986). The teaching of learning strategies. In M. Wittrock (Ed.), *Handbook of research on teaching* (pp. 315-327). New York: Macmillan Publishing Company.
- Weinstein, C.E., Schulte, A., & Palmer, D. (1987). *Learning and study strategies inventory.* Clearwater, FL: H & H Publishing.
- Winne, P.H. (1995). Inherent details in self-regulated learning. *Educational Psychologist*, 30, 173-187.
- Winne, P.H. (1997). Experimenting to bootstrap self-regulated learning. *Journal of Educational Psychology*, 89, 297-410.
- Winne, P.H., & Hadwin, A.F. (1998). Studying as self-regulated learning. In D. Hacker, J. Dunlonsky, & A. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277-304). Mahwah, NJ: Erlbaum.
- Winne, P.H., & Jamieson-Noel, D. (2002). Exploring students' calibration of self reports about study tactics and achievement. *Contemporary Educational Psychology*, 27, 551-572.
- Winne, P.H., Jamieson-Noel, D., & Muis, C., (2002). Methodological issues and advances in researching tactics, strategies, and self-regulated learning. In M. Maehr & P. Pintrich (Eds.), *Advances in Motivation and Achievement*, Vol 12 (pp. 121-155). Greenwich, CT: JAI Press.
- Winne, P.H., & Perry, N.E. (2000). Measuring self-regulated learning. In Boekaerts, P.R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation.* (pp.531-566). San Diego: Academic Press.
- Wolters, C.A. (1998). Self-regulated learning and collage students' regulation of motivation. *Journal of Educational Psychology*, 90, 224-235.
- Wolters, C.A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist*, 38, 189-205.
- Wolters, C.A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition and achievement. *Journal of Educational Psychology*, 96, 236-250.
- Yin, R.K. (1991). *Case study research.* Newbury Park, CA: Sage.
- Zimmerman, B.J. (1989). Models of self-regulated learning and academic achievement. An overview and analysis. In B.J. Zimmerman & D.H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (pp.1-38). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Zimmerman, B.J. (1994). Dimensions of academic self-regulation: A conceptual framework for education. In D.H. Schunk & B.J. Zimmerman (Eds.), *Self-regulation of learning and performance* (pp. 3-21). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Zimmerman, B.J. (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.J., & Martinez Pons, M. (1986). Development of structured interview for assessing students' use of self-regulated learning strategies. *American Educational Research Journal*, 23, 614-628.
- Zimmerman, B.J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, 82, 51-59.
- Zimmerman, B.J., & Schunk. D.H. (1989). (Eds.), *Self-regulated learning and academic achievement: Theory and research.* New York: Springer-Verlag.