1. Introduction

1.1 Background of the study

Research on learning processes changed the traditional view of learning as knowledge absorption into a view of learning as active knowledge construction. Students actively process information, using prior knowledge, skills, and strategies (Resnick, 1989). Learning is a constructive, cumulative, self-regulated, goal-oriented, situated, collaborative, and individually different process of knowledge building and meaning construction (De Corte, 2000). This new conception of learning, called constructivism, results in new ideas about the content of education. Education should not just focus on basic skills, but also on more complex outcomes such as metacognition.

In addition, the increasing speed of changes in societies and economies calls for attention for life-long learning. Governments, organisations and educators are keen to introduce active, self-directed and independent learning in schools to prepare students for this life-long learning. Students have to learn how to learn and how to regulate their learning processes. They need to be equipped with cognitive, metacognitive and affective skills before they can learn actively and independently (Bolhuis, 2000; Van Hout-Wolters, Simons & Volet, 2000).

There is general agreement, that schools and teachers have a pivotal role in helping students to acquire these skills and preparing them for independent learning. Instruction in cognitive, metacognitive and affective skills should be an integral part of regular instruction by regular teachers within a specific subject matter (Bolhuis, 2000; Van Hout-Wolters, Simons & Volet, 2000). As a consequence of the new insights in the learning process and the attention for new learning outcomes, ideas about the role of the teacher also change.

According to constructivists, the main task of teachers is no longer the transmission of knowledge, but the facilitation and coaching of learning (Korthagen, Klaassen & Russell, 2000). Teachers should share explicit information with students about how experts handle tasks, as instruction proceeds to accommodate students' emerging understanding and awareness. Ideally, they should act as mediators who stimulate the development of student understandings through recursive, reciprocal interactions in which both teachers and students play active roles and in which curricular understandings are gradually developed over time (Pearson et al, 1992). In sum, as a consequence of constructivist theory teaching is becoming a different profession.

However, there is still a substantial gap between theoretical insights in learning and instruction and the translation of these insights into school practices (De Corte, 2000). Most teachers now working in schools have not been prepared for their changing role and the new demands in their profession (Korthagen, Klaassen & Russell, 2000). The general instructional principles that are formulated on the basis of constructivism need elaboration for various subject matters and
educational levels (Verschaffel & De Corte, 1998) In other words, teachers need suitable instructional models that provide them with guidelines for instruction in new learning outcomes (Vermunt & Verschaffel, 2000).

There is an ongoing debate about the issue as to which instructional models might be most suitable for the new learning outcomes. Do teachers need totally new models or are expanded versions of well-known and tested models sufficient or maybe even better? Some scientists, who support the latter view, think that adaptations of instructional models will be sufficient to fit the changing role of teachers. Veenman (1992) for example suggests that the model of direct instruction, when it is extended to encompass the training of new outcomes, can be used for teaching basic skills as well as metacognition.

The direct instruction model is based on effectiveness studies. Educational effectiveness research studies the effects of characteristics of schools and teachers on the achievement of pupils. This line of research showed that certain qualitatively good instructional behaviours have positive effects on time to learn, opportunity to learn, and outcomes. These specific teacher actions were summarised in the direct instruction model. The impact of direct instruction on basic skills has been widely demonstrated (Muijs & Reynolds, 2001). Several experiments have shown convincingly that teachers can be trained successfully to implement this model in their lessons (Veenman et al, 1993; Hoogendijk & Wolfgram, 1995; Sliepen & Reitsma, 1993). However, we still do not know whether teachers can use the direct instruction model for teaching metacognition.

In contrast, other scientists think teachers need new instructional models such as reciprocal teaching, procedural facilitation, modelling, and cognitive apprenticeship (Resnick, 1989) in order to achieve new learning outcomes. These models were developed in the field of instructional psychology and are based on constructivist ideas about learning. These models aim especially at the development of metacognition but their appropriateness for the teaching of basic skills is not yet documented. Research on the effects of these models on metacognition showed some impact (Brand-Gruwel, 1995; Rosenshine & Meister, 1994). However, studies often took place in laboratory settings, where small groups of children were trained outside their classrooms and instruction was generally provided not by teachers, but by researchers (De Corte, 2000). As a consequence, it is still unclear whether regular teachers can successfully use these kind of models for teaching basic skills and metacognition.

This study addresses the following question:
How should regular school teachers structure their instruction when they want to stimulate the development of both basic skills and metacognition?

When schools should contribute to the development of metacognition, next to the teaching of basic skills, we need to develop instructional models that teachers can implement in their regular
classroom setting. The theoretical instructional models must be elaborated into concrete
descriptions of instructional behaviour that regular teachers can use with their pupils, within a
school subject. Besides that, these instructional models should positively influence both basic
skills and metacognition. Furthermore, it is important to know whether the instructional models
are suitable for teaching all pupils.

1.2 The design of the study

We chose to study two instructional models that originate from two different research
traditions, namely direct instruction and cognitive apprenticeship. With respect to direct
instruction, there is substantial empirical evidence that teachers can use this model in a
regular classroom setting. Furthermore, the direct instruction model proved to have a positive
effect on achievement in basic skills. The cognitive apprenticeship model (Collins, Brown &
Newman, 1989) focuses on the active involvement of pupils in the instructional process and
on the development of metacognition. This model combines effective elements of instruction-
psychological models such as reciprocal teaching, procedural facilitation and modelling.
However, this model has hardly been studied in regular classroom settings.
In this study, both the direct instruction model and the cognitive apprenticeship model were
implemented in regular classroom settings. Furthermore, both models were elaborated to
focus on the development of basic skills and metacognition. A quasi-experiment was
developed in which one group of teachers learned to implement the direct instruction model,
and another group was trained to apply characteristics of the cognitive apprenticeship model.
A control group of teachers was not trained. The implementation of the two models was
studied as well as the effects on the achievement of pupils in basic skills and metacognition.

1.3 Outline of the thesis

Chapter 2 describes the theoretical background of the two instructional models and the
research traditions they stem from. The characteristics of the direct instruction model and the
cognitive apprenticeship model are explained in detail. Furthermore this chapter goes into
empirical evidence concerning the implementation of the two models and the effects of the
models on students’ achievement and metacognition. The chapter concludes with a summary
of the main features concerning characteristics and research results of direct instruction and
cognitive apprenticeship.
The third chapter deals with the elaboration of the direct instruction model and the cognitive
apprenticeship model within this study. It describes the choices that were made in this
process aimed at the facilitation of the implementation of the two models in a regular
classroom setting. Several experts from both research traditions were asked to judge whether
the theoretical instructional principles were translated well into the elaborated models. Chapter 3 also describes the criticism of these experts and the adjustments that were made based on their comments. The elaborated instructional models are portrayed with a description of one specific lesson from each model. The remainder of this chapter pays attention to the training of the teachers. This part describes how theory about effective teacher training was used in the design of the training and coaching of the teachers in the study.

Chapter 4 deals with the methodology of the research project. It describes the research design, the research sample and the research instruments both on the teacher level concerning the implementation of the instructional models and on the pupil level concerning the achievement of pupils. Furthermore, this chapter specifies the procedures for data collection and the analyses of the data.

Chapter 5 studies the implementation of the instructional models in the lessons in reading comprehension. This chapter describes whether the teachers in the two experimental groups changed their instructional behaviour after the training. Furthermore, it goes into whether the two training conditions resulted in significant differences between each of the experimental groups and the control group and between the two experimental groups.

Chapter 6 discusses the effects of the two instructional models on the achievement and metacognition of the pupils. Again, the developments within the research groups are demonstrated and the differences between the three research groups are tested.

Chapter 7 shows how the instructional behaviour of the teacher is related to the achievement and metacognition of the pupils. It studies whether specific teacher behaviours can be identified that explain differences in learning outcomes.

The final chapter summarises and discusses the most important results, describes the limitations of the present study and gives directions for theory, research and practice.