RESEARCHING THE TEACHER – RESEARCHER

PRACTICE – BASED RESEARCH IN DUTCH PROFESSIONAL DEVELOPMENT SCHOOLS

MARJAN VRIJNSEN – DE CORTE

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In Loving Memory of my Dad Jules

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1

INTRODUCTION

1.1 INTRODUCTION TO THE RESEARCH PROBLEM

Currently there is a strong consensus within educational research and educational policy that continuous professional development of teachers[1] is crucial for improving the quality of education (Darling-Hammond, 2006, 2010; Fullan, 2007). In-school practice-based research through teachers-as-researchers has recently been put forth by researchers, teacher educators and policy makers as a potentially effective learning strategy for such continuous professional development of teachers (Burton & Bartlett, 2005; Loughran, 2002; Zeichner & Noffke, 2001). It is assumed that teacher-researchers through performing practice-based research activities construct new knowledge and develop new insights into own or shared educational practice (Lunenberg, Ponte, & van de Ven, 2007). The expectation is that as a result of teachers' professional growth, pupils' learning and learning results improve (Teitel, 2001, 2003). Particularly in so-called *professional development schools* ('PDSs'), teachers are encouraged to develop a research role in addition to their teaching role (Darling-Hammond, 2005). Following Darling-Hammond (2005) the aim of these PDSs is to create a rich research environment in which on the one hand the learning of student teachers (including the teacher-researcher role) is supported by settings in which they enter professional practice by working with expert practitioners, and where on the other hand experienced teachers are stimulated to develop themselves professionally via the conduct of practice-based research. However, empirical evidence for the assumptions that (student) teachers' research motives play an important role in performing in-school practice-based research activities, that as a result of these practice-based research activities (student) teachers learn professionally, that PDSs are a supportive context for this learning, and that pupils' learning and learning results improve as a result of this, is still scarce (see Figure 1.1).

[1] In this dissertation, the term teacher refers to both student teachers as well as practicing teachers.

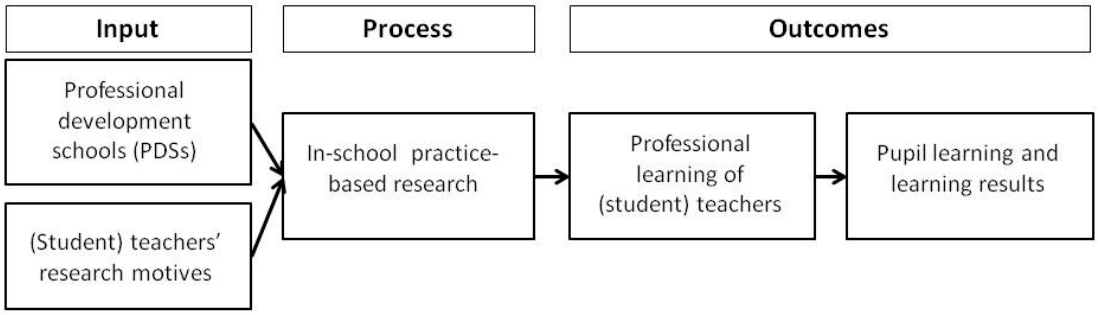


Figure 1.1: *Assumed relations between components of practice-based research in PDSs*

In this dissertation, we want to provide empirical evidence for the proposition that performing practice-based research in secondary education PDSs is a powerful incentive for the professional development of (student) teachers.

Therefore, the aims of this dissertation are:

1. Mapping the concepts associated with (student) teachers' practice-based research in schools in terms of research input, research process, and research outcomes. More specifically the following aspects will be investigated: (a) *contextual input,* or the realization of research environments in schools, (b) *personal input,* or teachers' and student teachers' motives for performing practice-based research, (c) the research *process,* or the performed practice-based research activities by teachers and student teachers, and (d) research *outcomes,* or the perceived outcomes regarding research and teaching following practice-based research.

2. Investigating the added-value of PDSs settings compared with non-PDSs settings. More specifically, PDSs and non-PDSs teachers' and student teachers' perceptions of concepts associated with practice-based research will be compared.

3. Testing a hypothetical model that describes the relations between teachers' and student teachers' perceptions of the input (contextual and personal), process and outcomes of practice-based research, and with that, the relative importance of these different aspects.

In the following sections we will successively present the theoretical framework underlying the research, the problem statement and research questions, and we will conclude with an overview of the whole dissertation.

1.2 THEORETICAL FRAMEWORK

1.2.1 PRACTICE-BASED RESEARCH IN SCHOOLS: PDSS

PROFESSIONAL DEVELOPMENT SCHOOLS

Internationally, teachers' practice-based research is often conducted within *professional development schools* ('PDSs') (Abdal-Haqq, 1998; Darling-Hammond, 2005, 2010; Holmes Group, 1990; Levin & Rock, 2003; Mule, 2006; NCATE, 2001; Snow-Gerono, 2005; Teitel, 2003, 2004). Examples can be found in Canada, Australia, England and the USA (Harris & van Tassel, 2005). PDSs were founded in the United States in 1986 as a reform initiative attributed to and promoted by the Holmes Group (Abdal-Haqq, 1998; Harris & van Tassel, 2005; Kleinsasser, 2000). PDSs were aimed to be innovative, multi-purpose school-university partnerships (analogous to teaching hospitals in medicine) in which school and university partners focus together on improving teacher education and the continuous professional development of practicing teachers as well as on increasing student achievement and conducting (collaborative) research directed at the improvement of practice (Castle, Fox, & Souder, 2006; Harris & van Tassel, 2005; NCATE, 2001; Ridley, Scott, Hurwitz, Davis Hackett, & Knutson Miller, 2005; Trachtman, 2007). Levine (1997) describes this further; PDSs weave what are thought of as separate strands of activity – pupil learning, teacher education, teachers' professional development, and practice-based research – together into an integrated learning environment (Figure 1.2). This integration results in pupil learning and teacher learning in the course of practice.

The term professional development school has been attached to a variety of collaborative efforts. Different PDSs have unique features, all with one general guiding principle, namely including a commitment to making reflection and research a central part of the school organization (Holmes Group, 1986).

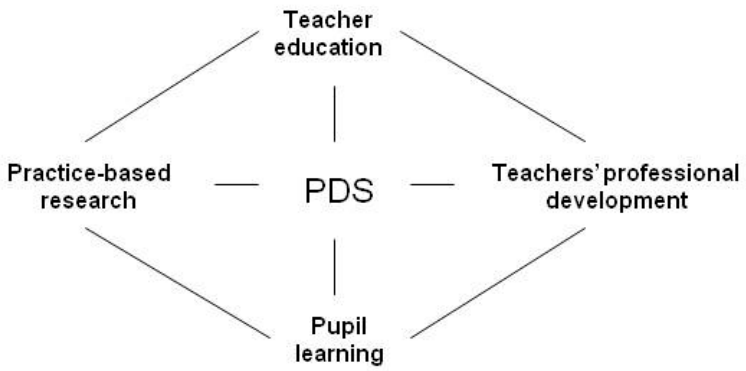


Figure 1.2: *Activity strands of a professional development school (PDS)*

According to the National Council for Accreditation of Teacher Education (NCATE, 2001) the PDS partners are guided by a joint responsibility for the learning opportunities of all those who are involved in the school and a common vision on teaching and learning, which is grounded in research and practitioner knowledge. In order to accomplish their goals, these PDS partners create new strategies, roles, responsibilities, and structures. According to Darling-Hammond (2005) PDSs aim to provide new models of teacher education and development by serving as exemplars of practice, builders of knowledge, and vehicles for communicating professional understandings among teacher educators, student teachers, and experienced teachers. They create environments in which the learning of student teachers (including the teacher-researcher role) is supported by settings in which they enter professional practice by working with expert practitioners, and where experienced teachers are enabled to renew their own professional development by carrying out practice-based research and assume new roles such as supervising student teachers with their teaching and practice-based research. Trachtman (2007) states that the potential impact of PDSs is related to one of its unique features: its strategical position at the intersection of teacher education and school reform. PDSs can initiate and sustain simultaneous renewal, as a vehicle for the transformation of schools and teacher education programs, because they involve educational stakeholders in research and reflective practice aiming at discovering how to collaboratively develop and maintain effective educational systems in schools and schools of teacher education (Holmes Group, 1986, 1990; Teitel, 2003). According to Teitel (2003) PDSs can be seen as places in which tensions historically existing between schools and universities can be resolved.

THE DUTCH CONTEXT

In the Netherlands, similar to other countries, efforts are undertaken to establish and maintain professional development schools in primary and secondary education. These Dutch PDSs are defined as "schools that combine the education of student teachers (their learning at the workplace) with practice-based research in the school, and encouraging school development and educational innovation" (Ministry of Education, Culture, & Science, 2005). It is assumed that at such schools, educational practice, the education of student teachers at the workplace, and practice-based research enhances each other. Student teachers learn to teach at the workplace of these PDSs and perform practice-based research as a required component of the teacher training curriculum. These PDSs also attempt to systematically stimulate experienced teachers' inquiring attitudes toward their own teaching practice. By means of performing practice-based research, (student) teachers develop their reflective research attitudes and gather knowledge and skills to perform practice-based research activities in their own teaching practice. All teachers in these PDSs have the opportunity to conduct research; however, in practice a (small) selection of the available teachers combines their teaching role with conducting practice-based research activities and/or supervising student teachers. Teachers in these schools can thus act both as a researcher of their own (or shared) educational practice as well as a supervisor of student teachers carrying out practice-based research as part of their teacher training. To develop schools in which learning, the education of student teachers, reflection, practice-based research, knowledge construction and circulation, and innovation go hand in hand with each other, these schools work together in partnerships with other primary or secondary education schools and schools of teacher education.

The past few years, the Dutch Ministry of Education, Culture and Science provided candidate PDSs with financial grants (by means of several governmental grant schemes) for the benefit of realizing school environments with practice-based research through teachers-as-researchers as an important feature. Until now, two developmental phases with accompanying grant schemes have passed. The first, 'in-depth pilot' started in 2005 and lasted until 2008 (Ministry of Education, Culture and Science, 2005). Approximately 20 partnerships with collaborating schools and schools of teacher education participated. This 'in-depth pilot' was directed at the exploration of quality criteria for PDSs and the warrant and examination of learning inside these schools. The second, 'deepening phase' started in 2008 and lasted until 2011 (Ministry of Education, Culture, & Science, 2009). During this phase, 22 partnerships participated. This 'deepening phase' intended to gather deeper insight

into additional quality criteria and conditions, and into extra costs of PDSs, all by means of good practical examples (Ministry of Education, Culture, & Science, 2009). A third 'establishing phase' directed at the realization of sustained PDSs is still underway (started in 2011 and will continue until 2016) (Ministry of Education, Culture, & Science, 2011). At the moment of printing this dissertation, it has not yet been disclosed how many partnerships will participate in this developmental phase.

1.2.2 PROFESSIONAL LEARNING THROUGH PRACTICE-BASED RESEARCH

PRACTICE-BASED RESEARCH BY TEACHERS-AS-RESEARCHERS

In-school practice-based research is commonly seen by researchers, teacher educators and policy makers as an important activity for the professional development of both experienced and prospective teachers (Cochran-Smith & Lytle, 2009; Zeichner & Noffke, 2001). Although research into the effectiveness of doing practice-based research by teachers gives indications that it can contribute to the professional development of student teachers (Darling-Hammond & Bransford, 2005), large-scale comparative research that shows doing practice-based research actually contributes to the quality of student teachers is missing (Cochran-Smith & Zeichner, 2005; Grossman, 2005; Van Veen, 2012, in press). Since empirical evidence is limited, certainly in the context of the Netherlands, it is interesting to further investigate the process and outcomes of conducting practice-based research.

The practice-based research or so-called practitioner research of teachers can take different forms, represent different genres and entail different interpretations depending on the ideological, historical and epistemological frameworks adopted, including for example action research, design-based research, self-study or narrative inquiry (Cochran-Smith & Lytle, 2009; Zeichner & Noffke, 2001). This practice-based research entails a (collaborative) reflective process by which teachers themselves critically examine their own (or shared) educational practices and investigate the specific practical problems and concerns emanating from these practices. Teacher research adds an interaction between theory and practice to teachers' reflective practice (Lunenberg et al., 2006) but also provides cyclic research techniques to enhance and systematize reflection (Ponte, 2002a). The purpose of this practice-based research is to develop teachers who have the capacity to use research and research-derived competencies in their ongoing teaching and decision-making (Westbury, Hansén, Kansanen, & Björkvist, 2005).

Both student teachers and experienced teachers have to acquire the teacher-researcher role, which differs from their regular teaching role. Besides having a positive attitude towards research, teachers should be able to perform their own practice-based research projects. Often, these (student) teachers have little or no prior experience with in-school practice-based research. In PDSs, experienced teachers can perform research activities in their schools and use practice-based research for their own continuous embedded professional development and improvement of their educational practice. To stimulate student-teachers' reflection, practice-based research has an important position in the curriculum of most schools of teacher education, internationally as well as in the Netherlands.

THE PRACTICE-BASED RESEARCH ENVIRONMENT (CONTEXTUAL INPUT)

Practice-based research activities by teachers-as-researchers require a research supportive and stimulating learning environment in schools, including an infrastructure suitable for performing practice-based research (Cochran-Smith & Lytle, 2009; Darling-Hammond, 2005), school leaders who support and propagate a policy that links practice-based research to school practice in a way that research and research results can actually enable improvement and innovation (Ebbutt, 2002), but also a culture in which individual teachers are willing to (collaboratively) conduct and be actively involved in performing research (Schussler, 2006; Snow-Gerono, 2005) and where colleagues appreciate emerging research initiatives. To create professional space for experienced teachers' and student teachers' professional learning through (collaborative) practice-based research, partnerships between schools and schools for teacher education are realized (the Holmes Group, 1990). It has been argued that because teachers in PDSs find themselves within these unique learning environments, they can more easily conduct practice-based research (Dana, Smith & Yendol-Hoppey, 2011).

TEACHERS' RESEARCH MOTIVES (PERSONAL INPUT)

In the literature, several expected outcomes for teachers-as-researchers are proposed as goals for teachers' practice-based research projects in schools. By means of carrying out practice-based research, teachers are assumed to deepen their understanding of own (or shared) educational practice including pupil learning and learning results (Cochran-Smith & Lytle, 2009; Ponte, 2005). It is expected that teachers, through conducting practice-based research activities, can acquire deep practical knowledge about the causes and consequences of their actions, find answers to their specific practical problems, and provide evidence about what

works in practice and why (Cochran-Smith & Lytle, 2009; Cordingley, 2003; Ponte, 2005). Based upon their developed practical knowledge and the results of their practice-based research projects, teachers can improve, evidence-based, their own or shared educational practice and solve practical problems in their classrooms and/or school organization (Elliott, 2008). These intended results of practice-based research activities, form important motives for teachers to conduct practice-based research in their schools.

THE PRACTICE-BASED RESEARCH PROCESS

In different phases of their practice-based research projects (student) teachers perform various research activities. In the literature, several models with approximately the same content have been put forth to guide the process of designing teachers' practice-based research (Burton & Bartlett, 2005; Hubbard & Power, 1993, 1999; Lankshear & Knobel, 2004; Mills, 2000; Ponte, 2002c). Research activities can for example relate to the exploration and definition of the research problem(s) and question(s), resulting in a proposed research plan; to the realization of the proposed research plan, such as collecting and analyzing research data; to the evaluation of the carried out practice-based research or to making the research and research results public. To be successful, the practice-based research activities of (student) teachers have to meet certain quality standards. Several authors have proposed quality standards for the evaluation of practice-based research (Altrichter, Posch, & Somekh, 1993; Anderson & Herr, 1999; Elliott, 2007; Oancea & Furlong, 2007; Verschuren, 2009a, 2009b). Verschuren (2009a, 2009b) makes a useful distinction between scientific standards and usefulness standards. According to Verschuren a balance must be struck in finding a context-specific optimum between those scientific and usefulness standards for every practice-based research project again. The question is to what extent such standards are actually met in practice.

OUTCOMES OF TEACHERS' PRACTICE-BASED RESEARCH

Practice-based research as a professional learning activity provides both student teachers as well as practicing teachers with ongoing opportunities to actively develop their professional knowledge and skills related to their professional practice (Guskey, 2002). Prerequisite for continuously performing and using practice-based research through teacher-researchers are their positive attitudes towards research (cf. Kirkpatrick & Kirkpatrick, 2006) and the appreciation of its benefits (cf. Kincheloe, 2003). Both aspects influence the extent to which teachers perceive their role as researchers as meaningful, as well as the extent to which they

will learn. Resulting from their practice-based research activities, teachers' attitudes towards research and their appreciation of the benefits, can improve. Besides this, performing practice-based research is expected to contribute to an increased awareness of teaching and learning processes and the development of teachers' critical reflective attitude (Cochran-Smith & Lytle, 1999a; Loughran, 2002; Zeichner & Noffke, 2001). Furthermore, by means of carrying out practice-based research, teachers are assumed to deepen their understanding of own (or shared) educational practice, including pupil learning and learning results (Cochran-Smith & Lytle, 2009; Ponte, 2005). It is expected that teachers, through conducting practice-based research activities, can acquire deep practical knowledge about the causes and consequences of their actions, find answers to their specific practical problems, and provide evidence about what works in practice and why (Cochran-Smith & Lytle, 2009; Cordingley, 2003; Ponte, 2005). Based on teachers' richer and deeper understandings of own educational practice (Loughran, 2002) and the actively gathered practical knowledge (Cochran-Smith & Lytle, 1999a), teachers are assumed to be better able to continuously revitalize and renew, evidence-based, their teaching practice (Elliott, 2008; Gore & Gitlin, 2004; Lunenberg et al., 2007; Zeichner & Noffke, 2001). Furthermore, they can possibly better adapt this practice to changing educational contexts, pupil behaviors and expectations of other teachers (Day, 1999). Last, by doing their own practice-based research, teachers are more likely to be critically and deeply engaged in educational innovations (Kincheloe, 2003). Prior research has shown that in order for teachers to change or improve their performance and behavior, it is important that teachers believe they can achieve these changes (Bandura, 1997). These efficacy beliefs are conditional for achieving the actual outcomes of teachers' practice-based research projects.

1.2.3. PROBLEM STATEMENT AND KEY QUESTIONS

FOCUSING ON PERCEPTIONS

While the theoretical aims and ideals of a PDS are described in the literature (Holmes Group, 1990; NCATE, 2001), relatively little is known about the perceptions that school leaders, teachers and student teachers have of (the role of) practice-based research within their PDS, both regarding the situation they prefer (preferred perception) as well as the actual situation in their school (actual perception). This is also the case for the Dutch PDS context. Distinguishing both perceptions makes sense as it has been argued that schools experience difficulty in achieving their research aims and desires (Ministry of Education, Culture & Science, 2008). A more

comprehensive and complete overview of perceptions will not only be achieved by making a distinction between perceptions of the actual and preferred situation (Fraser, 2007), but also by distinguishing between perceptions of different types of participants (e.g. 'participant groups' of school leaders, teachers, and student teachers). The latter is important to ensure taking into account possible actor-observer differences (den Brok, Bergen, & Brekelmans, 2006).

CHARACTERISTICS, QUALITY AND PERFORMANCE

Practice-based research activities performed by teacher-researchers can be featured by means of several characteristics related to the context, content and discourse function of the research. Despite the differences between different types of practice-based research, these characteristics distinguish this research from other forms of educational research. To be successful, (student) teachers' practice-based research activities have to meet certain quality standards. Several authors have proposed criteria or standards for investigating research quality. However, research on the quality and impact of teachers' practice-based research performed within PDSs, is scarce (Dana et al., 2011).

Clarke and Hollingsworth (2002) underline the usefulness of their Interconnected Model of Teacher Professional Growth to evaluate the outcomes of professional learning opportunities. By means of this (adapted) model, teachers' professional growth following their practice-based research can be investigated in four change domains constituting the teachers' professional world namely the personal domain, the domain of practice, the domain of consequences, and the external domain.

COMPARING PDSS AND NON-PDSS SETTINGS

While prior studies have provided some support for the argued potential of PDSs, the success of PDSs was often not compared to the regular school setting (Levin & Rock, 2003; Snow-Gerono, 2005; Yendol-Silva & Dana, 2004). Most descriptions of (perceived) outcomes of practice-based research for teachers in PDSs were small-scale, qualitative descriptions of 'success' stories. According to Breault (2010), much of what has been written about PDSs contains accounts of such personal experiences. Furthermore, descriptions of experiences with practice-based research in PDSs were usually restricted to the perceived (learning) outcomes of teachers resulting from their research projects (Clark, 1999; Cooner & Tochterman, 2004). In many of these investigations, other factors influencing the actual research outcomes, for example, the culture of the school, supportive conditions, and teacher-researchers' motives for carrying out practice-based research, were not

taken into account. Finally, in most of these studies, the focus was mainly on the preparation of prospective student teachers and much less on the professional development of experienced teachers.

RELATIONS BETWEEN INPUT, PROCESS AND OUTCOME VARIABLES

While prior results of research have indicated possible relations between input, process and outcome variables associated with practice-based research performed by teachers and student teachers in schools, in many studies the influence of performing practice-based research leading to certain research outcomes was most times not empirically explored. In these studies, research outcomes were reported but they were not explained by other influencing variables such as the research context in schools or the practice-based research process itself. Also, insight into the relative importance of the different factors associated with (student) teachers' practice-based research was not investigated.

KEY QUESTIONS

The aim of this dissertation was to provide insight into (student) teachers' practice-based research in secondary education schools and to find empirical support for the added value of the PDS context with respect to this professional learning activity. Four studies were conducted for these purposes using both qualitative and quantitative research methods. The following four key questions will be addressed in this dissertation:

1. What are participants' – school leaders', teachers' and student teachers' – perceptions of the actual and preferred situation regarding practice-based research in Dutch PDSs?

2. What features characterize teachers' practice-based research activities and what is the impact of these activities in terms of quality standards and criteria, and learning outcomes?

3. Do PDSs make a difference in terms of (student) teachers' perceptions of input (contextual and personal), process and outcomes of in-school practice-based research?

4. What model explains the empirical relations that exist in (student) teachers' perceptions of factors associated with the input (contextual and personal), process and outcomes of in-school practice-based research?

In the following chapters, these four key questions will be split up in more specific research questions and sub questions.

1.4 OVERVIEW OF THE STUDY

In the next chapters, the results of four studies exploring the implementation of (student) teachers' practice-based research in (Dutch) PDSs will be presented.

Chapter Two presents a study on participants' (e.g., school principals', teachers' and student teachers') perceptions of the context, process and outcomes of practice-based research in Dutch PDSs. In this study, eight school principals, ten teachers and six student teachers (N=24) from four PDSs in the Netherlands were asked for their perceptions by means of a semi-structured interview. This chapter was published in the 'European Journal of Teacher Education'.

Chapter Three reports on an in-depth case study, in which the impact of six teacher-researchers' practice-based research projects in PDSs is investigated. The characteristics of the practice-based research projects, teachers' research performance as perceptible in their research reports and their perceived (learning) outcomes as a result of these research projects, were the focus of this study. Three research instruments were developed: a coding scheme for investigating practice-based research' characteristics, a rating instrument with research standards for rating the quality of teachers' research performance, and a coding scheme for investigating teachers' perceived professional growth. This chapter has been submitted for publication.

In *Chapter Four*, teacher-researchers' and researching student teachers' perceptions of practice-based research were compared for PDS and non-PDS settings. Based upon research findings of the two prior studies, the Questionnaire on Teacher Research (QTR) was developed. By means of this questionnaire, respondents (N=102) were asked for their perceptions regarding (a) the research environment in their schools (including the partnership), (b) their motives for conducting practice-based research, (c) the research process itself (the conducted research activities and respondents' satisfaction with the performed activities), and (d) their perceived professional growth with respect to their researching role and their teaching role. This chapter has been resubmitted for publication.

Chapter Five describes the investigation of causal paths (relations) between respondents' perceptions of contextual input variables (structure, culture, and partnership), a personal input variable (research motivation), process variables (planning and performing research, and evaluating and reporting research) and outcome variables (outcomes regarding 'teaching', and outcomes regarding 'researching') of practice-based research in secondary education schools, by means of structural equation modeling. In the study, 56 teacher-researchers and student-teachers who carried out practice-based research were asked for their perceptions by means of the developed Questionnaire on Teacher Research (QTR). This chapter has been submitted for publication.

Finally, in *Chapter Six*, the results of the four studies are summarized for each of the research questions. This is followed by a general discussion of the main findings, including theoretical and practical implications that can be derived from the findings, some limitations of the study and suggestions for future research. In Figure 1.3, an overview of the different chapters in this dissertation is presented.

All studies of the research project reported on in the chapters 2 to 5 have been set up as an article for an international peer-reviewed scientific journal. Hence, every chapter is also written to be read on its own. As a result, some recurrence and overlap across chapters was inevitable.

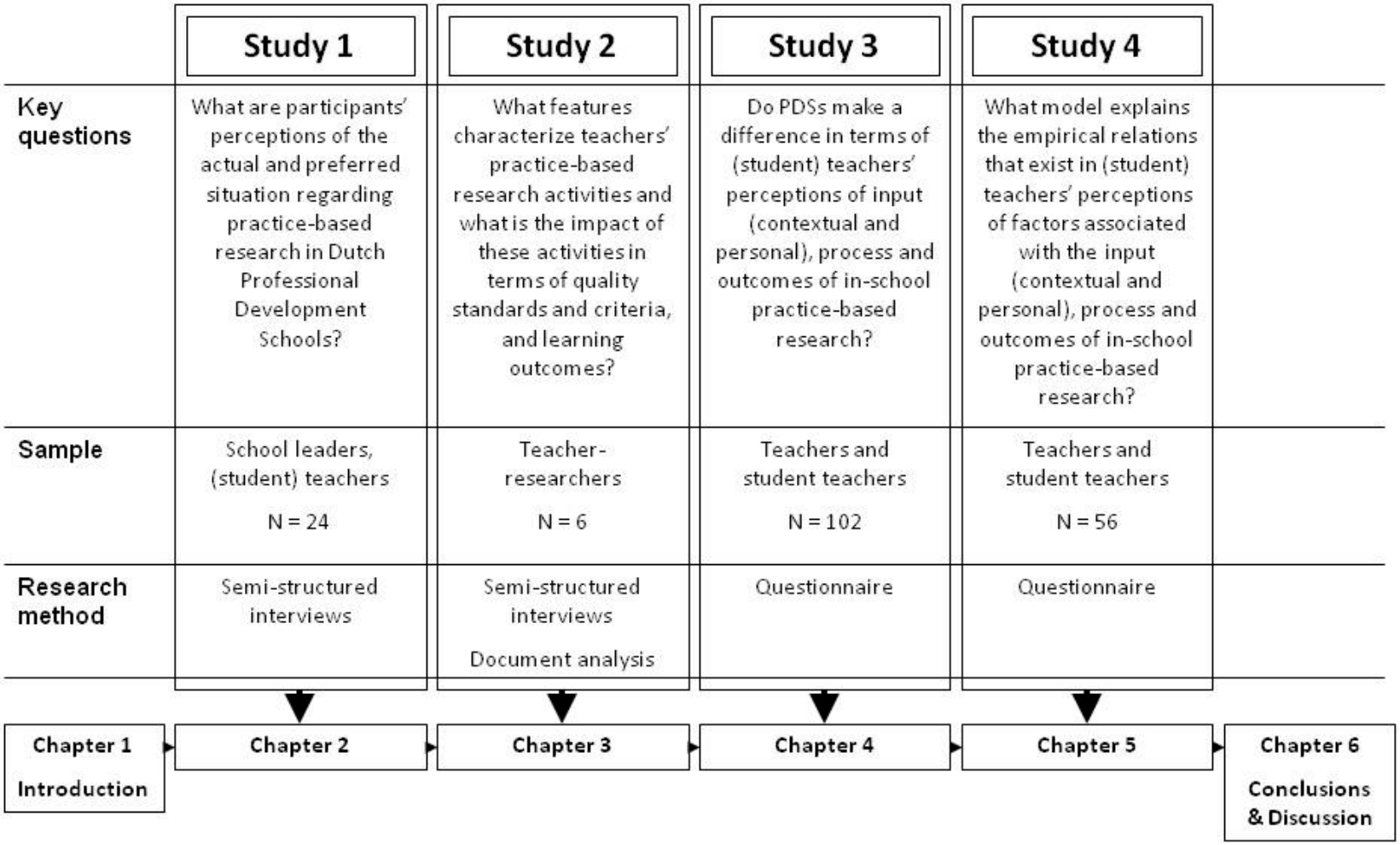


Figure 1.3: *Overview of the dissertation*

CHAPTER

2

TEACHER RESEARCH IN DUTCH PDSS: PERCEPTIONS OF THE ACTUAL AND PREFERRED SITUATION IN TERMS OF THE CONTEXT, PROCESS AND OUTCOMES OF RESEARCH[2]

ABSTRACT

This study aims to provide deeper insight into participants' (e.g. school principals', teachers' and student teachers') perceptions of the actual and preferred situation in terms of the context, process and outcomes of practice-based research through teachers-as-researchers at Dutch Professional Development Schools (PDSs). We interviewed eight school principals, 10 teachers, and six student teachers from four PDSs in the Netherlands. A trend displayed across all types of participants was their focus on the context dimension of research. Moreover, respondents often focused in rather general terms on the process of conducting teacher research within the school and the content of this research. A major difference existed between perceptions of the actual and preferred situation related to the effects of teacher research on pupils' outcomes: despite the central focus of research on pupil learning and learning results, according to participants, effects on pupil level were not (yet) reached at this moment. These results suggest that in Dutch PDSs increased attention is needed both by researchers and practitioners on the process and outcome dimensions of doing teacher research.

[2] This chapter has been published (online) in adapted form as:
Vrijnsen – de Corte, M., den Brok, P., Kamp, M., & Bergen, T. (2012). Teacher research in Dutch professional development schools: perceptions of the actual and preferred situation in terms of the context, process and outcomes of research. *European Journal of Teacher Education,* DOI: 10.1080/02619768.2012.662639.

2.1 INTRODUCTION

Recent findings of research on teacher learning indicate that continuous professional development of teachers is crucial for improving the quality of education (Darling-Hammond, 2006, 2010; Fullan, 2007). At the same time, there are serious concerns with the effectiveness of teacher education and professionalization programs. This has resulted in a heightened interest in activities supporting teachers' professional learning. A possible promising activity for continued in-school teacher professional development is carrying out *practice-based research through teachers-as-researchers* (Burton & Bartlett, 2005; Cochran-Smith & Lytle, 1999a, 2009; Ponte, Ax, Beijaard, & Wubbels, 2004; Zeichner & Noffke, 2001). It is expected that teachers, through conducting practice-based research activities, acquire deep knowledge regarding the effectiveness of their own or shared educational practice (Lunenberg et al., 2007). The expectation is that through carrying out practice-based research teachers' functioning, and as a result pupil learning and learning results, improve (Teitel, 2001, 2003). However, practice-based, in-school research activities by teachers require a research-supportive learning environment and research culture, such as an infrastructure suitable for research, a policy that links research to school practice, but also an individual willingness by teachers to conduct and to be actively involved in performing research (see for example Ebbutt, 2002). In the present study the current state of affairs regarding teacher research in Dutch *Professional Development Schools* (PDSs) is investigated. Moreover, it is investigated whether these schools are perceived as supportive environments for these teacher research activities and if – according to the perceptions of participants - the environments and research processes (activities) generate the desired results.

Internationally, teacher research is often conducted within PDSs (Berger, Boles, & Troen, 2005; Darling-Hammond, 2005; Harris & van Tassel, 2005; Holmes Group, 1990; Levin & Rock, 2003; NCATE, 2001; Teitel, 2001, 2003). According to Darling-Hammond (2005, p: vii):

"Professional Development Schools are an undertaking of schools and teacher education institutes to create learning environments in which student teachers can combine theory and practice in a setting organized to support their learning, in which experienced teachers can renew their own professional development and assume new roles as (for example) mentors, and in which school and teacher educators together can engage in research and rethinking of practice and work collaboratively to design and implement learning experiences for student teachers and experienced teachers."

In the Netherlands, similar to other countries, efforts are undertaken to establish and maintain PDSs. In the Netherlands, a typical PDS works together in a partnership with other primary or secondary education schools and teacher education institutes in higher education and/or universities. Between Dutch PDSs differences exist with respect to the focus on teacher research within the school. The four PDSs studied here combine education and supervision of student teachers with the performance of practice-based research by teachers-as-researchers within the school. Teachers in these schools can thus act both as a researcher of their own (or shared) educational practice as well as a supervisor of student teachers carrying out practice-based research as part of their teacher training. In addition, in these schools (student) teacher learning, experienced teachers' professional development, and practice-based research activities within the school are connected with educational innovations and school development (cf. Darling-Hammond, 2005). The performed teacher research thus has to fit with the policy and innovative objectives of the school and relevant themes of professional development. The PDSs attempt to systematically stimulate teachers' inquiring attitudes towards their own teaching practice. All teachers of these PDSs have the opportunity to conduct research; however, in practice a (small) selection of the available teachers want to combine their teaching role with conducting practice-based research activities and/or supervising student teachers. PDSs differ in selecting the participating teachers: in some schools teachers are asked by school leaders to participate or decide to participate in research because it is part of their job description or part of policy with respect to task and salary differentiation; at other schools school leaders formulate research programs and only allow teachers to participate when their research questions or research plans fit with these programs; or teachers are asked to research a question related to school policy or developments in the school organization in which they are already participating.

While the theoretical aims and ideals of a PDS are clear from the literature, relatively little is presently known about the perceptions that school leaders, teachers and student teachers have of (the role of) practice-based research within their PDS, both regarding the situation they prefer (preferred perception) as well as the actual situation in their school (actual perception). This is even stronger the case for the Dutch PDS context. The aim of this study, therefore, is to provide insight into participants' *perceptions* of practice-based research through teachers-as-researchers within the context of the PDS. The focus lies on the context (contextual aspects) of implementing in-school teacher research, the process of being engaged in (conducting) research activities and the outcomes (results and effects) of in-school teacher research.

2.2 THEORETICAL FRAMEWORK

2.2.1 TEACHER RESEARCH (ACTIVITIES) IN PDSS

In the literature, practice-based research activities by teachers-as-researchers have been suggested as one type of means to foster meaningful teacher professional (knowledge) development (Burton & Bartlett, 2005; Cochran-Smith & Lytle, 1999a, 2009; Ponte et al., 2004; Roberts, Crawford, & Hickmann, 2010; Zeichner & Noffke, 2001). By carrying out practice-based research, teachers are assumed to be able to self-develop knowledge about the causes and consequences of their actions, to find answers to specific practical problems and questions, and to provide evidence of what works in practice and why (Cochran-Smith & Lytle, 2009; Ponte, 2005). The specific practical problems and concerns of teachers themselves constitute the questions teachers want to research in this type of research (Stenhouse, 1981). Teacher research extends Schön's notion of the 'reflective practitioner' (1983), the image of the teacher who strives for professional self-development through a critical consideration of his or her practice. Thereby, this inquiry-based attitude goes beyond the standard reflective competence for teachers (Educational Advisory Committee, 2006). Teacher research adds an interaction between theory and practice to teachers' reflective practice (Lunenberg et al., 2007) but also provides cyclic research techniques to enhance and systematize reflection (Ponte, 2002). In this way, teachers actively gather systematic knowledge about their own or shared practices. In addition to this, pupils can be seen as a source of information that can provide teachers with a valuable source of data for personal reflection and often form the starting point of teachers' research projects (Hoban & Hastings, 2006; Ponte, 2005). Last, conducting practice-based research activities collaboratively and in dialogue with colleagues also stimulates professional growth (Garet, Porter, Desimone, Birman, & Yoon, 2001; Putnam & Borko, 2000). Teacher learning activities, such as carrying out teacher research in schools, are assumed to be more successful when they are embedded in '(professional) learning communities' or 'communities of practice' (Cochran-Smith & Lytle, 1999b; Groundwater-Smith & Dadds, 2006).

2.2.2 OUTCOMES OF TEACHERS' RESEARCH ACTIVITIES

Based on the literature, besides the development of a more positive research attitude and the improvement of research knowledge and skills, different possible

effects can be distinguished with respect to carrying out practice-based research by teachers-as-researchers. First, practice-based research is expected to contribute to an increased awareness of teaching and learning processes and the development of teachers' critical reflective attitude (Cochran-Smith & Lytle, 1999a; 2009; Loughran, 2002; Zeichner & Noffke, 2001). Second, by carrying out practice-based research activities, teachers actively develop new practical knowledge (Ponte et al., 2004) and provide their own evidence of what works in practice and why. According to Kwakman (2003), it is the development of new practical knowledge by teachers themselves which is a prerequisite for developing professional practice. Third, based on teachers' richer and deeper understandings of own educational practices (Loughran, 2002) and the actively gathered 'knowledge of practice' (Cochran-Smith & Lytle, 1999a), teachers are assumed to be better able to continuously revitalize and renew their teaching practice (Elliott, 2008; Gore & Gitlin, 2004; Lunenberg et al., 2007; Zeichner & Noffke, 2001). Furthermore, they can better adapt this practice to changing educational contexts, pupil behaviors and expectations of other teachers (Day, 1999). Fourth, by doing their own research teachers are more likely to be critically and deeply engaged in educational innovations. According to Kincheloe (2003, p 18-19), teachers that join research will more likely be seen as 'learners', rather than 'functionaries' who follow up top-down orders without question; they will be seen as 'knowledge workers who reflect on their own professional needs and current understandings.' This means that current teacher roles are enriched with the roles of researcher, innovator and of (curriculum) developer. Thus, it is assumed that teachers-as-researchers act as 'change agents' in classrooms and schools (Cochran-Smith, 2008; Zellermayer & Tabak, 2006). Due to a better understanding of their pupils' learning processes, their own teaching practice, and the results of their practice-based research, teachers are supposed to take wiser decisions and more considered, substantiated actions in the context of educational practice and educational innovations. The teacher-as-researcher development is in line with education policy demanding teachers to provide 'evidence' for their assumptions about their actions and the consequences of these actions (Ponte, 2005; Educational Advisory Committee, 2006), so that they can improve their practice and professionalism as an 'informed professional' (Earl & Katz, 2006).

Results of recent studies investigating teacher research in the context of a PDS have reported that experienced teachers perceived changes in their own practice and improvements at the classroom and school level as a result of being involved in professional development, in carrying out practice-based research, and in assuming a mentoring role (Darling-Hammond, 2005). According to a study by Levin and Rock

(2003) on experienced teachers' learning as a result of undertaking collaborative research activities together with student teachers in the context of PDS, experienced teachers gathered new understandings about their students and teaching. When teachers focused their attention on students, they also gained deeper insight into students' perspectives, showed increased awareness of students' needs and motivations, and reported more elaborate knowledge of students' progress, abilities and achievement (Levin & Rock, 2003).

2.2.3 PRECONDITIONS FOR TEACHER RESEARCH: THE CONTEXT

Implementing teacher research in the context of a PDS is a complex and multi-dimensional innovation which has implications for the processes of learning and teaching at all levels of the school organization, including the schools-teacher education institute partnership. Research has shown that it is difficult to realize these PDS partnerships. Different authors name several reasons for this: the lack of support in and outside each institution for successful implementation of the collaboration, the inexperience with collaborative decision making, uncertain environmental constraints and the scarcity of resources or funding for change, and the lack of transparency and formalization of responsibilities, tasks and roles (Darling-Hammond, 2005; Doolittle, Sudeck, & Rattigan, 2008; Rice, 2002; Schepens & Aelterman, 2007). Furthermore, the establishment and maintenance of the collaborative relationship between partners is difficult because several obstacles have to be taken, such as the cultural differences between partners based on tradition, prior relationships and attitudes, the development of trust, parity and reciprocal respect between both partners, the identification of partners' individual interests and objectives that can become the basis for common goals and mutual interests, and the creation of effective ways of communicating and respectfully working together (Darling-Hammond, 2005; Doolittle et al., 2008; Gerwitz, Shapiro, Maguire, Mahony, & Cribb, 2009; Rice, 2002; Schepens & Aelterman, 2007).

Besides the more large scale difficulties with regard to the realization of research supportive environments in partnerships, this kind of educational innovation is neither easy to manage at the school organization level. According to Fullan (2007), teachers need to have 'ownership' about the innovation (in this case: research in the PDS) and they need to see the innovation as a learning process. If so, chances increase that the preferred innovation has the character of a 'second order change' which means that teachers actually integrate this innovation in their daily educational practice. Hence, it is critically important to learn about teachers' (and

principals') perceptions and beliefs regarding (the implementation of) practice-based research in the PDS.

2.2.4 FOCUSING ON PARTICIPANT PERCEPTIONS

Following Fraser (1994), we distinguish between participant's perceptions of the *actual* and *preferred* (or ideal) situation in terms of the context, process and outcomes of teacher research in PDSs. By doing so, we aim to find elements of the research environment (context), research processes and activities, and results and consequences of research perceived as *important* by involved participants as well as elements perceived to be actually *present* by these participants. Perceptions of the preferred situation regarding teacher research are concerned with goals and value orientations as they measure perceptions of the ideal or preferred context for teacher research, process of researching own or shared educational practice, and desired results of these research activities. Perceptions of the actual situation concerning teacher research measure the degree to which participants feel the context for teacher research, the process of conducting practice-based research activities, and the results of these research activities are in existence or visible. Distinguishing both perceptions makes sense as it has been argued that schools experience difficulty in achieving their research aims and desires. It is hoped that via detected differences between the actual and preferred situation schools can be provided with advice on how to strengthen research at their school. A more comprehensive and complete overview of perceptions will not only be achieved by making a distinction between perceptions of the actual and preferred situation, but also by distinguishing between perceptions of different types of participants (e.g. 'participant groups' of school principals, teachers, and student teachers). The different participants play different roles in the PDS research context: some are actively involved in conducting research (actors), others support or embed this research (principals) or are the observers or consumers of the results of the research (parents, students, student teachers). To ensure taking into account these possible actor-observer differences, a differentiation between perceptions of varying participant groups is necessary (see for example den Brok et al., 2006).

2.2.5 RESEARCH QUESTIONS

Based on the aim of the study and the theoretical notions discussed above, the present study focuses on the following two research questions:

1. What are participants' (e.g. school principals', teachers', student teachers') perceptions of the actual and preferred situation regarding teacher research in the context of PDSs with respect to the context for research, process of conducting research activities and outcomes from research?

2. What differences and/or similarities appear between participants' perceptions of the actual and preferred situation with respect to the context, process and outcomes of research, and what differences and/or similarities can be detected in this respect between different types of participants (teachers, school leaders, and student teachers)?

2.3 METHOD

2.3.1 PARTICIPANTS

Four secondary education schools of one PDS partnership in the south-east of the Netherlands participated in the present study. These four schools worked together in a partnership with two academic universities and one professional university. The schools are comprehensive schools[3]. At each of the four schools, respondents at different organizational levels (school principals, teachers and student teachers) were selected. Using theoretical sampling (Glaser & Strauss, 1967), the researchers asked school principals of the four different schools to select key respondents (e.g. respondents with knowledge on or involvement in teacher research) for three different levels (e.g. the management level, teacher level, and student teacher level). Selected respondents were contacted by the researchers and participated voluntarily. Initially, we aimed to have the same number of respondents for each level and for each school: two school managers, two supervising and/or coordinating teachers, and two student teachers. In practice, a total of eight school managers, ten teachers and six student teachers participated (N=24). Table 2.1 shows the four PDSs, the accompanying respondents, and the organizational level of each respondent in this study.

[3] These schools offer pre-university education, general senior secondary education and pre-vocational secondary education; the three major streams in Dutch secondary education.

Table 2.1
Respondents

	School leaders	Teachers	Student teachers	Total school
School A	2	2	2	6
School B	2	2	2	6
School C	2	4	1	7
School D	2	2	1	5
Total respondents	8	10	6	24

2.3.2. DATA COLLECTION

At each of the four schools, data were collected via semi-structured interviews with the selected principals and (student) teachers. The interview-guide consisted of a series of topics to be discussed, each by a series of open-ended questions, without a predetermined order. Respondents were allowed to talk free and open about their perceptions. The first author conducted all interviews, and each interview handled the same set of topics (with the exception of the questions asked to student teachers, because they could not answer policy related questions). The interviews for the first two cases (school A and B) were conducted at the end of 2007 and beginning 2008; the interviews for the other two cases (school C and D) at the end of 2008 and beginning 2009. This stepwise data collection was a result of the fact that the first two schools started implementing research earlier than the other two schools.

During the interviews, respondents were asked to formulate their perceptions regarding the actual and preferred situation with respect to teacher research in the context of a PDS, with a particular focus on the context, process and outcomes of teacher research.

2.3.3 CONSTRUCTION OF THE CATEGORY SYSTEM

All 24 interviews were transcribed verbatim, and a category system was developed. The development of the category system and the actual coding with the Atlas.ti software occurred in two phases.

In the first phase, transcripts were coded in terms of the *type of perception* (actual versus preferred perception) uttered. Interview fragments or sequences of utterances in which a perception of the actual or preferred situation concerning teacher research was visible, were identified (e.g. not all utterances focused on teacher research). An example of a coded transcript is provided in Table 2.2.

Table 2.2

Example of coded transcripts phase 1 and phase 2

Speaker	Utterance	Phase 1 'Type of perception'	Phase 2 'Content of perception'
Teacher	'If I need to give my opinion, I am not positive about this partnership yet'	Perception of the actual PDS	Partnership
School leader	'In my ideal situation there would be teachers who are totally familiar with carrying out practice-based research on their own activities'	Perception of the preferred PDS	Teacher results

During the second phase, the coded fragments from phase 1 were also coded with regard to the *content of the perception*. The construction of the category system started from the notion of the three theoretical dimensions discussed namely context, process and outcomes. The reviewed literature indicated that within each of these dimensions several potentially important theoretical concepts might be distinguished within each dimension, like for example a supportive school policy (context dimension), a close cooperation between partners, and teachers 'ownership' of the innovation (context dimension). Hence, we started with a set of constructs within each dimension, but iteratively changed this set in the first steps of the analyses via constant comparison with the topics mentioned by respondents.

The interview fragments were thus analyzed in a 'grounded' manner (i.e. grounded theory with a process of open coding) (Strauss & Corbin, 1990). Because this study was a first exploratory step into participants perceptions of teacher research in the context of a PDS, fragments were not only analyzed qualitatively, but also more quantitatively (frequency count). When a certain statement did not fit a particular code, it received additional codes. An example of a coded transcript is also provided in Table 2.2.

After coding ten interviews, saturation was reached: each code was constantly compared to all other codes. Therefore, codes that were subsequently found to overlap were merged, and others too broad were split up. We used peer debriefing to discuss the codes found. Every established code was compared with the literature, and based on this; sample statements and a definition were established. In a few iteration steps between literature and the established categories, a final set of codes emerged. Nine main aspects (categories) falling under the three main dimensions from the literature emerged as a result of the described coding process. In Table 2.3 these aspects and associated dimensions are presented together with their definitions (category system 'Teacher Research in PDSs'). The details of the subcategories distinguished within each aspect are presented in the results section, where subcategories will be visualized through illustration and description of the found patterns.

Table 2.3

Category system 'Teacher Research in PDSs'

Dimension	Aspect	Description
Context	Conceptual PDS	The definition of the PDS and the support and familiarity of the participants with the concept
	Position of the research	The position of (student) teacher research within the PDS
	Policy aspects	The school policy concerning the implementation of (student) teacher research within the PDS
	Physical design aspects	The physical design of the school organization supportive for carrying out (student) teacher research within the PDS
	Partnership	The cooperation between the school and teacher training institutes with the aim of realizing (student) teacher research within the PDS
Process	Research activities	Research activities teachers undertake while carrying out their practice-based research concerning own or shared educational practice
Outcomes	Teacher results	Results of teacher research within PDS at the level of the teacher
	Pupil results	Results of teacher research within PDS at the level of the pupil
	School results	Results of teacher research within PDS at the level of the school organization

2.3.4 DATA ANALYSIS

The final set of definitions and codes of the category system were used to code all 24 interviews (including the ten interviews used for the initial coding system development) regarding both the *type of perception* and the *content of the perception*. Sometimes, when a specific interview fragment included more than one topic (content of the perception) it received multiple codes. After coding the whole transcript, inter-rater reliability was determined to check the reliability of coding for both phases. Regarding the first phase, a second independent person coded 29 interview fragments of three semi-structured interviews encompassing both coding categories (actual and preferred). Inter-rater reliability for this phase was 89.7% in terms of percentage of agreement and 0.79 in terms of Cohen's Kappa. These values indicated the coding phase to be reliable (Cohen, 1960). After the preliminary category system for the content of respondents' perceptions had been developed, tested and established, its reliability was also checked by determining inter-rater reliability (percentage agreement and Cohen's Kappa). Regarding this phase, a second independent person coded 74 interview fragments of one semi-structured interview encompassing all nine categories. When a specific interview fragment had several codes, inter-rater reliability was checked for al associated codes. Inter-rater reliability for this phase was 76,0% in terms of percentage of agreement and 0.72 in terms of Cohen's Kappa. These values indicated this coding phase also to be reliable (Cohen, 1960). Intra-rater reliability of the coding (established by checking initial coding and coding by the same rater six months later) was 93,3% in terms of percentage of agreement and 0.92 in terms of Cohen's Kappa. Finally, for the quantitative part Chi-squared tests were executed to test differences in participants' actual and preferred perceptions and between different participant groups' perceptions.

2.4 RESULTS

Table 2.4 displays the overall results for the *type of perceptions* (actual or preferred) and the *content of these perceptions* for the context, process and outcome dimensions and the nine associated aspects of teacher research. In 1393 out of 2075 fragments (67%) participants discussed the actual situation concerning teacher research at their school, in 682 out of 2075 fragments (33%) they talked about the preferred situation.

Table 2.4

Total results participants' perceptions (N frequency and %)

Dimension and aspect	Preferred (P)						Total P		Actual (A)						Total A		Total	
	SL		T		ST				SL		T		ST					
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Context																		
Conceptual PDS	15	5	25	7	1	3	41	6	49	10	56	9	16	6	121	9	162	8
Position of the research	38	13	22	6	1	3	61	9	56	11	90	15	33	11	179	13	240	12
Policy aspects	35	12	38	11	1	3	74	11	69	14	68	11	23	8	160	12	234	11
Physical design aspects	23	8	50	14	3	9	76	11	74	15	110	18	60	21	244	18	320	15
Partnership	24	8	59	17	10	29	93	14	51	10	87	15	35	12	173	12	266	13
Total context	135	46	194	55	16	47	345	51	299	60	411	68	167	57	877	63	1222	59
Process																		
Research activities	22	7	43	12	4	12	69	410	47	9	94	16	51	18	192	14	261	13
Total process	22	7	43	12	4	12	69	410	47	9	94	16	51	18	192	14	261	13
Outcomes																		
Teacher results	78	26	75	21	9	27	162	24	91	18	62	10	51	18	204	15	366	18
Pupil results	14	5	12	3	1	3	27	4	25	5	11	2	4	1	40	3	67	3
School results	47	16	28	8	4	12	79	12	39	8	523	4	18	6	80	6	159	8
Total outcomes	139	47	115	33	14	41	268	39	155	31	96	16	73	25	324	23	592	29
Total	296	100	352	100	34	100	682	100	501	100	601	100	291	100	1393	100	2075	100

Note: SL = School leader, T = Teacher, ST = Student teacher

Note: Different participants' preferred perceptions: $X^2 = 49.7$, df = 16, $p < 0.01$; Different participants' actual perceptions: $X^2 = 66.7$, df = 16, $p < 0.01$

When looking at the content of the perceptions, respondents spoke the most about context features (preferred 51% and actual 63%). Besides these context-related statements, participants talked about outcomes of teacher research in 39% of all coded preferred fragments and in 23% of all coded actual fragments. The smallest part of all fragments was related to the process dimension (preferred 10% and actual 14%). Table 2.4 also shows statistically significant differences between different participants' perceptions.

Figure 2.1a and 2.1b show different emphases in participant groups' perceptions (e.g. school principal, teacher, and student teacher) of the preferred and actual situation concerning teacher research in their PDS regarding the nine aspects. In the next section of the results, these (different) perceptions concerning each aspect will be described more in-depth.[4]

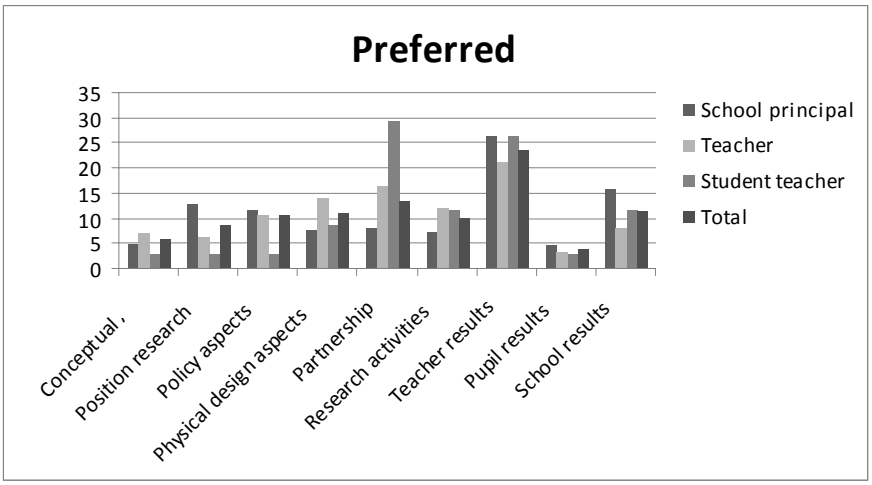


Figure 2.1 a: *Different participants' perceptions of the preferred situation (%)*

CONCEPTUAL PDS (CONTEXT)

Of all context-related aspects, participants spoke the least about the 'conceptual' (or theoretical) PDS (preferred 6% and actual 9%). Participants defined the preferred conceptual PDS with at least one of the following features: availability of teacher research, integration of research with the training of student teachers, and connection of research with school and/or educational development.

[4] Citations are illustrated with interview fragments of different respondents. In these fragments, SP = School Principal, T = Teacher, and ST = Student Teacher.

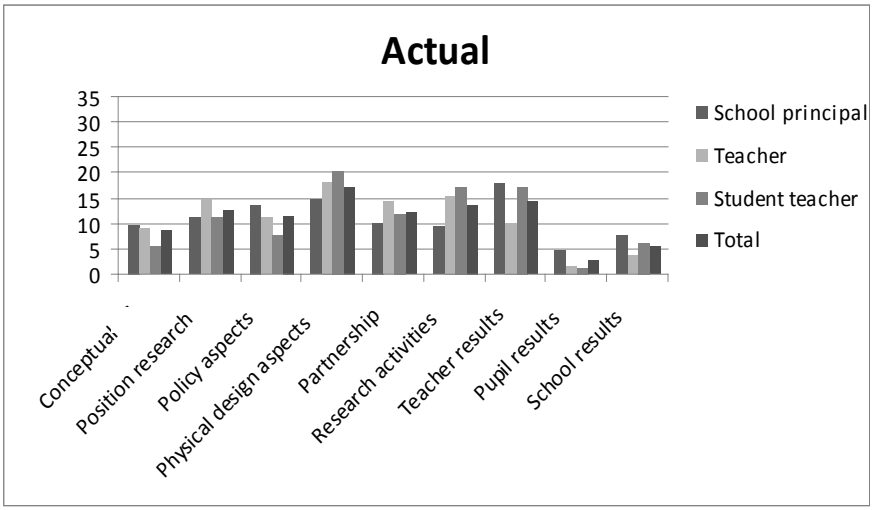


Figure 2.1 b: *Different participants' perceptions of the actual situation (%)*

In participants' perceptions of the actual PDS, there was still a lot of obscurity and vagueness regarding the concept 'teacher research in PDSs' and the expectations for those who are participating, particularly student teachers. Several participants (both school principals and teachers) argued that their schools were going forward with creating support for teacher research, but that at this moment the concept had not yet really 'landed in the organization'.

'An action to accomplish is to get more people having ownership about the development. I know different people having the vision of teacher research in the professional development school, but this has absolutely not landed in the organization.' [SP]

PARTNERSHIP (CONTEXT)

The largest part of context related fragments regarding the preferred PDS involved the preferred partnership between schools and teacher education institutes (14%). Teachers (17%) and student teachers (29%) talked most about this partnership; for student teachers this was even the largest part of all coded 'preferred' fragments. School principals focused relatively less on this partnership compared to other context-related aspects (8%). According to all participants, the ideal PDS referred to a partnership in which both institutions are 'full' partners in educating student teachers.

When asking the participants for their perception of the actual situation for this element, they were not yet that positive about the cooperation between the partners in the current partnership. They frequently mentioned one or more of the

following difficulties: failure of cooperation, obscurity of what constitutes the partnership, lack of communication, absence of (formal) agreements, lack of alignment between partners, minimal exchange and support between both partners, or failure of training student teachers together. In their statements, participants mainly ascribed these difficulties to teacher education institutes. Also, the clarity of the (quality) requirements for (student) teachers' research was not yet accomplished according to several participants of all three different participant groups.

'I think the professional development school needs very good agreements and a manual about who is doing what, who's responsibility is what, and that you make the agreement nothing changes during the process by partners individually, only in consideration with all partners together. You need to regulate this much better and that is always an issue of good communication between the schools and the teacher training institutes.' [SP]

ORGANIZATIONAL ASPECTS (CONTEXT)

Participants spoke in 11% of all coded 'preferred' fragments about organizational aspects (school principals 8%, teachers 14%, and student teachers 9%). The participants preferred a supportive climate for conducting teacher research. In other words, in the ideal situation there should be a supportive school organization stimulating in-school practice-based research through teachers-as-researchers. This also meant, according to some participants (mainly school principals and teachers), that members of the school organization actively formulate research questions or constitute a research program for teachers' research.

These organizational aspects constituted the largest part (18%) of all coded 'actual' fragments (and thus of all context-related 'actual' fragments). All participant groups talked elaborately about these aspects: for school principals this amounted to 15%, for teachers and student teachers to 18% and 21%, respectively. According to participants, the value of teacher research was generally recognized at their school, but the topics of relevance or their programmatic character were not yet subject of discussion. Several participants (mainly teachers) mentioned the fact that in their schools people seemed more concerned with realizing organizational structures that support teacher research than with the content of that research. The question 'what is a good structure for our school' remained still unanswered, however.

With respect to the preferred situation for this element, teachers and to some degree school principals argued there should be learning communities (groups of teacher researchers learning together) embedded in the school organization, with critical friends ('sparring' partners) for support and feedback in or outside these

learning communities. All participants mentioned that these learning communities started only recently and were 'still in the process of establishing their desired functions'. According to some participants (teachers and school principals), there was little empirical evidence in the schools on how these learning communities were functioning. Also, the position of student teachers in the communities was still a subject of discussion in most schools.

POLICY ASPECTS (CONTEXT)

Besides organizational aspects, participants referred to policy-related aspects (preferred 11%, actual 12%). It were mainly teachers (both perceptions 11%), and school principals (preferred 12%, actual 14%), who focused on these aspects. In their preferences participants named structural facilities (time, money, space) and stimulating school principals as essential conditions for conducting in-school teacher research. The participants also argued for the presence of a supportive school policy (that integrates teachers' professionalization through teacher research in the school's personnel policy) as a feature for the preferred PDS.

According to several participants, at this moment teacher research was not yet 'really' at the heart of their school's policy and was not yet embedded in the human resource management of the schools. However, school principals were acting in a stimulative fashion. Researching teachers experienced (and school principals supported this) that low structural facilitation likely leads to difficulties and limited possibilities for conducting teacher research within the school.

POSITION OF RESEARCH (CONTEXT)

A final contextual aspect mentioned by participants was the position of teacher research within the school (preferred 9%, actual 13%). In terms of preferred perceptions, only school principals (13%) and teachers (6%) spoke about this element. They argued that in-school teacher research should be integrated with the training of student teachers (so that they participate) and the existing developments and educational innovations in their school organization. In participants' actual perceptions the position of research appeared relatively in a large extent. Several participants mentioned that the integration of teacher research in the training of student teachers and/or existing educational developments had not (yet) been accomplished.

Several participants mentioned the importance of 'ownership' of the (student) teachers of their practice-based research projects. Participant perceptions of the actual situation showed that this had not yet been realized: sometimes (student)

teachers had a lot of influence on their topics and setup of their projects, at other times they had no ownership over research projects at all.

Last, some participants preferred a relation between teacher research and the educational mission of the school and the role of pupils within this research. However, in their opinion this was not the present reality.

RESEARCH ACTIVITIES (PROCESS)

Of all possible topics, participants spoke the least about the 'process' dimension (preferred 10%, actual 14%). Teachers and student teachers talked the most about research activities in their school (teachers 12% and 16%, respectively, student teachers 12% and 18%). School principals spoke the least about these research activities (preferred 7%, actual 9%). All participants mentioned they worked systematically while conducting practice-based research. Some participants advocated that all members of the school organization should be involved in (conducting) research.

A very apparent finding was that all respondents discussed research (activities) in very general terms, participants hardly referred to what systematic and high quality teacher research and the process of conducting research should look like. Participants only used very general terms, such as 'I am doing practice-based research' or 'I experienced the research process as…' to refer to conducting research activities. They thus did not speak about specific research activities, such as 'collecting data', 'analyzing data', or 'presenting findings'.

'Really self following the steps of a research process.' [ST]

'Self carrying out research to your own teaching practice.' [T]

'Structural doing research at your own school.' [SP]

Some participants (mainly teachers and some school principals) mentioned that in their opinion there was more attention for the in-school practice-based research (process) of student teachers. These research projects seemed, according to respondents, more intense, larger, better supported with arguments, and better planned. They wondered how to manage the quality of their own and student teacher research. A few teachers referred to 'mentoring student teachers' (not only with their practice-based research but also with their teaching practice) as a potential (and preferable) research objective. In their perceptions of the actual situation this element was absent.

PUPIL RESULTS (OUTCOMES)

With respect to the outcome dimension, it was noticeable that participants referred more to preferred than actual results of teacher research. Of all outcome-related actual and preferred fragments, pupil results clearly were the smallest part (preferred 4%, actual 3%). All participants, but mainly the teachers and school principals, argued that pupils should be the central purpose of research: their learning and achievements should improve. Some participants also mentioned the stimulation of more pupil research within the school subject curriculum, the improvement of pupils' research skills and research attitudes, and better quality of research conducted by pupils.

'I think you need to formulate the purpose of this in terms of what do pupils notice of this, they are the core business of the school.' [SP]

'We want to develop a research attitude at our school whereby pupils and teachers are looking critical to their own functioning and through several perspectives to different situations.' [T]

Respondents were divided about to what degree these results had been achieved (actual situation). According to some participants (all participant groups) there was no effect of teacher research on pupils, except from the fact that they were respondent in some research projects. There were also participants who were convinced about effects at the level of the pupils, but wondered about how to find empirical evidence for this. All participants concluded that a critical research attitude and improved research skills of pupils had not yet been achieved.

TEACHER RESULTS (OUTCOMES)

The largest part of the outcome-related fragments (actual and preferred) concerned teacher results. All participant groups mentioned these results. Participants discussed the professionalization of teachers and the increasing quality of staff members. They referred to 'taking responsibility for' and 'awareness of own teaching practice' as preferred results. Asking participants for their perception of the actual state of these outcomes, several participants (teachers and school principals) said the value of teacher research for professional development was recognized, but at the same time was not yet used as a conscious strategy in the school organization.

In terms of several respondents' preferred perceptions, there should be research expertise within the school as well as a critical research attitude as normal teacher behavior. This research expertise and critical research attitude had increased, but according to participants an enduring critical (research) attitude would take more

time to develop. Related to this in-school research expertise, respondents argued that teachers should develop themselves in mentoring or guiding student teachers', other colleagues' or pupils' research, and for doing so they should have developed resources and trajectories. Regarding mentoring, several participants (teachers and school principals) reported that teachers had just started to experiment with the mentoring role. However, some suggested that not all of the supervising teachers had experienced (practice-based) research themselves at this moment, even though they supervised others with research.

Teachers and school principals also mentioned the fact that conducting teacher research should generate motivational results, such as job satisfaction, task differentiation, room for development, pleasure, et cetera. According to participants (mainly teachers), some of these elements, like pleasure and the feeling of having room for development, had already been realized.

SCHOOL RESULTS (OUTCOMES)

Besides teacher and pupil results, participants mentioned results at the school level (preferred 12%, actual 6%). According to several teachers and school principals, in the ideal situation teacher research should create a dynamic school: it should work like a 'flywheel' for further educational renewal and school development, and the improvement of teachers' own teaching practice. As far as actual perceptions were concerned, it was noticed that several participants argued that in-school teacher research already had delivered these kind of results.

Some participants (from all participant groups) also mentioned as a preferred result more adequate responses of teachers to the introduction of new educational innovations. According to some participants, there was already more consciousness of and more favorable attitudes towards being involved in educational innovations and development projects, and pupils received higher quality instruction and more challenging education already.

2.5 CONCLUSION AND DISCUSSION

The aim of this study was to obtain deeper insight into the realization of teacher research in Professional Development Schools in the Netherlands. This study should be considered as a first step in this direction, as it was limited to four PDSs of one (larger) partnership network. Participants of these schools were asked for their perceptions of the actual and preferred situation concerning teacher research in

terms of the context, processes and outcomes of practice-based research activities by teachers-as-researchers.

Based on our research we can conclude that a large difference between the actual and preferred situation was noticeable. This implies that according to respondents realizing the preferred context, process and outcomes of teacher research, was difficult. Participants (and participant groups) differed not only in their perception of the implementation process (the actual situation) but also in the (preferred) features for realizing teacher research they pointed out. When comparing respondents' perceptions to the literature (outlining the theoretical ideal with respect to teacher research in the context of a PDS), it seemed that most of the topics mentioned in the literature were present in respondents' views. Topics often mentioned in the literature that also returned in our interviews were elements such as: linking teacher research to school policy and student teacher supervision (e.g. Darling-Hammond, 2005), consciousness and reflection on own practice and practices of colleagues (Burton & Bartlett, 2005; Cochran-Smith & Lytle, 1999a; 2009; Ponte et al., 2004; Roberts, Crawford, & Hickmann, 2010; Zeichner & Noffke, 2001;), using students as starting point and data source (Hoban & Hastings, 2006; Ponte, 2005), undertaking research collaboratively with peers, critical friends and in the context of learning communities (Cochran-Smith & Lytle, 1999b; Groundwater-Smith & Dadds, 2006), changed outcomes in terms of awareness of own practice (Cochran-Smith & Lytle, 1999a, 2009; Loughran, 2002; Zeichner & Noffke, 2001) and elaborated practical knowledge of teaching (Lunenberg et al., 2007; Zeichner & Noffke, 2001) and a changed attitude towards innovations (Cochran-Smith, 2008; Kincheloe, 2003; Zellermayer & Tabak, 2006), among other things. However, even though the content of perceptions to some degree resembled what was mentioned in literature, many elements seemed to be merely present in participants 'ideal images' but much less so in their perceptions of the actual situation. Furthermore, aspects were implemented in very different degrees, for some elements respondents could not provide concrete examples or empirical evidence, while other elements had just been implemented (such as the constitution of learning communities).

When looking more in detail, a first observation is that when looking at different participant perceptions, we can conclude that there seems to be strong attention for the conditions for (or context dimension of) teacher research. This raises the question whether school leaders and teachers in schools were actively thinking about the innovation's content (second order change) or whether they were merely structuring and organizing it (first order change). As is known from the literature, for successful implementation secondary order changes are needed (Fullan, 2007).

This also relates to the 'agency' and 'ownership' aspect of the innovation by teachers and schools. Do teachers understand for what purpose they were doing practice-based research and were they using and applying this research to control their own functioning? Or were they involved just because they were given time, because it was part of their task/job description or because their school principals had told them to do so? Were schools concerned with formulating what they really wanted with in-school teacher research or were they merely following policy makers? On the other hand, given the fact that the implementation of Professional Development Schools in the Netherlands has only recently begun (since 2007), it was not surprising that schools were still concerned with the structural and organizational aspects.

A second notable finding in participants' perceptions was the apparent complexity of realizing a partnership between the different partners involved in the PDS. In our research, a significant discrepancy was found between perceptions of the 'ideal' and the 'actual' PDS in this respect. As is known from research on the implementation of PDSs (Darling-Hammond, 2005; Doolittle et al., 2008), it is very difficult to develop effective partnerships between schools and teacher education institutes. However, it is striking that the PDS participants in our study showed a strong external disposition. They attributed the failure of an effective partnership to shortcomings of the teacher training institutes rather than their own limitations. This may be a result of the fact that only participants working at the schools themselves were interviewed, rather than external participants (such as teacher trainers or external researchers). Nevertheless, in a high quality partnership between different partners, all should be contributing to and take initiative with respect to the exchange and cooperation in the partnership, including the schools themselves.

Thirdly, our research stresses the importance of accomplishing a 'research oriented culture' at all levels of the school, including pupils. Participants several times mentioned the preferred realization of a learning organization with all teachers (and student teachers) involved in research, school development and supervision, if possible even members of the school leadership. This aligns with ideas brought forward by Berger, Boles, & Troen (2005), who mention elements for successful teacher research that at the same time form paradoxes during implementation: (1) teacher research should be mandated for all teachers if it is to have an impact on the culture of the school at large, but principals cannot force teachers to engage in teacher research; (2) the principal is a strong factor in the success or failure of teacher research as a school-wide reform, but the question of ownership is by the teachers; (3) there must be an outside actor with ideas, support, etc. (partner), but

what if there is no partner or if the external partner has a questionable role?; (4) teachers need to learn research skills, but they don't always want to. Also, there is the risk that teacher research is limited to individual teachers or the learning communities, but that these communities are ignored by the broader school context or even take a direction opposite to the mainstream school culture (Berger et al., 2005).

Additionally, although respondents stressed that pupils' learning and the quality of their education should be the central purpose and outcome of research in the PDS, striking is the fact that pupil results made a very small portion of all participants' perception statements (both actual and preferred). At this moment, pupil learning and outcomes seemed not to be a central focal area of the participants.

This suggests that (at this moment) at least within these four schools there is a shift needed with respect to the purpose of conducting in-school teacher research: from a focus on the contribution of research to school learning and school development to more emphasis on the professional learning of teachers and - as a result – the improved learning and learning results of pupils.

2.5.1 STRENGTHS AND LIMITATIONS

The strength of this study lies in the distinction between two types of perceptions: actual and preferred perceptions. By doing so, areas for discussion and improvement can be discerned based on (large) differences between both types of perceptions. The present study suggested a particular need for schools to be more focused on pupil outcomes, on the quality of and knowledge with respect to conducting research and the place of research within the partnership, related to the roles that the different partners take in this partnership. Another strength is its differentiation between the perceptions of three different participant groups: school principals, teachers and student teachers. Together they lead to a more comprehensive picture of what is seen (by participants) as a 'conductive' implementation of teacher research at their schools.

Obviously, this study also had some limitations. Semi-structured interviews with 24 participants of four Professional Development Schools in one Dutch partnership were used to map participants' perceptions. The present results, therefore, cannot be generalized to other PDS networks in the Netherlands. Investigating or comparing other partnerships and schools could suggest the uniqueness or stability of the findings of the present study. Besides, perceptions of participants of teacher education institutes were neither collected in the present study. This would be a

useful addition for future research and provide an even more complete and comprehensive picture, in particular with respect to the elements relating to the partnership or to the quality and supervision of research (activities).

This study was descriptive and exploratory in nature. Hence, links between the different elements and dimensions were not (or limitedly) investigated. While the present study showed a similar set of elements to be important as mentioned in the literature, the degree to which these elements were implemented and had an effect on each other could not be investigated. This was an effect of the procedure, in which participants were asked separate questions on the different elements and dimensions, rather than that they were asked to describe their research history or research projects. It is, however, our intention to take up this element in a next study, in which we are planning to analyze teachers' research plans, writings, results and presentations regarding their research projects.

Finally perceptions of teachers and school leaders often differ from observations by external observers or pupils (e.g. den Brok et al., 2006; Fraser, 1994). In future research, using other types of data collection and research instruments – such as observations or student questionnaires – can be useful for obtaining insight into the developing process of teacher research in Dutch Professional Development Schools and differences between what is in the heads of involved participants and what is visible to outsiders. It seems, in the Netherlands there is still a long – but promising – way to go with teacher research in the context of the PDS.

CHAPTER

3

PRACTICE-BASED RESEARCH BY TEACHERS IN PROFESSIONAL DEVELOPMENT SCHOOLS: CHARACTERISTICS, PERFORMANCE AND LEARNING OUTCOMES[5]

ABSTRACT

In-school, practice-based research by teachers is often seen as a potentially effective strategy for stimulating professional development. In this case study, the characteristics of six teacher research projects, teachers' research performance and the perceived learning outcomes as a result of the practice-based research projects were investigated. The findings show the research projects to be well-embedded in the personal practices of the teachers. The research projects did not always reach expected quality standards. And the perceived learning outcomes resulting from teachers' practice-based research projects were higher for those projects which met the quality standards than for those which did not. The developed coding instruments in present study can help guide the teacher-researchers to conduct and report high-quality practice-based research.

[5] This chapter has been submitted in adapted form as:
Vrijnsen – de Corte, M., Bergen, T., Kamp, M., & den Brok, P. *Practice-based research by teachers in professional development schools: characteristics, performance and learning outcomes.*

3.1 INTRODUCTION

In-school, practice-based research by teachers has recently been put forth by researchers, teacher educators and policy makers as a potentially effective learning strategy for the continuous professional development of teachers (Burton & Bartlett, 2005; Loughran, 2002; Zeichner & Noffke, 2001). Particularly in so-called professional development schools (PDSs), teachers are encouraged to develop a research role in addition to their teaching role (Darling-Hammond, 2005). Professional development schools work together in partnerships with primary and/or secondary education schools and teacher education institutes. The aim of the professional development school is to create an environment in which the learning of student teachers (including the teacher-researcher role) is supported by settings in which they enter professional practice by working with expert practitioners and where experienced teachers are stimulated to develop professionally via the conduct of practice-based research (Darling-Hammond, 2005). In such a manner, experienced teachers can construct new knowledge and develop new insights into educational practice and therefore help develop the knowledge base for professional practice (Dana et al., 2011).

In order to make these objectives achievable, the practice-based research activities of teachers have to meet certain quality standards. Several authors have proposed quality standards for the evaluation of practice-based research (Altrichter et al., 1993; Anderson & Herr, 1999; Elliott, 2007; Oancea & Furlong, 2007; Verschuren, 2009a, 2009b). The question is to what extent such standards are met. According to Reason (2006) it is not necessarily a question whether the teacher-researchers have done well, but of how well they have done and whether they have done well enough for the claims they may wish to make (p.198). However, research on the quality and impact of teachers' practice-based research performed within PDS walls, is scarce (Dana et al., 2011).

In the following, we will first consider the characteristics of teachers' practice-based research projects. We will then consider the standards available for evaluating the quality of practice-based research and thereafter discuss a framework for understanding outcomes of teachers' practice-based research. Subsequently, we will investigate (a) the characteristics of the practice-based research projects of teacher-researchers in two Dutch professional development schools, (b) the quality of their performed research activities by means of a developed rating system, and (c) the perceived learning outcomes of these teacher-researchers. Deeper insight into the characteristics and impact of teachers' practice-based research projects can

contribute to the further development of (Dutch) Professional Development Schools, and suggest direction for educational policies regarding the implementation of teacher research in such schools.

3.2 THEORETICAL FRAMEWORK

3.2.1 CHARACTERISTICS OF TEACHERS' PRACTICE-BASED RESEARCH

The practice-based research or so-called practitioner research of teachers can take different forms, represent different genres and entail different interpretations depending on the ideological, historical and epistemological frameworks adopted, including for example action research, design-based research, self-study or narrative inquiry (Cochran-Smith & Lytle, 2009; Zeichner & Noffke, 2001). Despite these differences, there are also similarities which distinguish practice-based research by teachers from other forms of educational research. Cochran-Smith and Lytle (2009) have distinguished eight core characteristics of practice-based research: two content-oriented characteristics, two contextual characteristics, two characteristics which concern the discourse function of the practice-based research and two characteristics which concern the research methods.

The first of the two content characteristics identified for practice-based research by teachers is the *aim of practical knowledge construction.* The purpose of such research is to deepen teachers' understanding of one's own or shared educational practices. Via practice-based research, teachers themselves can gain insight into the causes and consequences of their actions, explore and find answers to practical problems and gather evidence for what works in actual practice and why (Ponte, 2005).

The second content characteristic identified for practice-based research by teachers is the *aim of improving educational practice.* The purpose of such research is also presumably to foster good professional practice. The knowledge and expertise gained from the practice-based research can help teachers improve one's educational practice and help solve practical problems encountered in the classroom and school organization.

The first of the two contextual characteristics of practice-based research by teachers is *ownership of the research question.* Practice-based research is conducted by the teacher-researcher as the 'problem owner'.

The second contextual characteristic of practice-based research by teachers is *embeddedness in professional practice.* Teacher-researchers examine their own specific professional context with their professional practices as a focus of the research. The aims of doing this can range from critical reflection on daily practice to better understanding observed discrepancies between what is intended and what actually occurs. According to Cochran-Smith and Lytle (2009), the questions formulated by teacher-researchers largely depend on how they frame things theoretically, what assumptions they make, what decisions they make and how they interpret different aspects of the research problem. The questions posed by the teacher-researchers do not, thus, emanate from just theory or practice but from teachers' critical reflection on the intersection of the two (Cochran-Smith & Lytle, 2009). Pupils can help embed the practice-based research of teachers in professional practice by providing information and input for personal reflection and in this way become the starting point of teachers' research projects (Bustingorry, 2008; Hoban & Hastings, 2006; Ponte, 2005).

The first discourse-related characteristic of the practice-based research of teachers is *community and collaboration*. The practice-based research activities of teachers in schools are regarded most successful when they are embedded in so-called 'professional learning communities' where teachers expand their knowledge and skills in a critical dialogue with colleagues as 'critical friends' (Cochran-Smith & Lytle, 1999b; Cornelissen, 2011; Groundwater-Smith & Dadds, 2006; Ponte, 2002b). Critical friends can help each other reflect on what one does and why, mainly by asking questions (Burnaford, Fischer, & Hobson, 2001), sharing ideas/experiences, receiving or providing feedback (Putnam & Borko, 2000), generating and enacting new strategies for the work environment and — above all — sharing insights with regard to what they have learned (Wenger, 1998). According to Kwakman (2003), teachers perceive discussions with colleagues in collaborative settings as relevant and valuable for the improvement of their own teaching practice. The development of different forms of collaboration related to teachers' practice-based research can create new professional spaces either inside or outside the school organization (e.g., the development of new school-university partnerships and joint practice-based research projects) (Baumfield & Butterworth, 2007; Cornelissen, 2011; McLaughlin & Black Hawkins, 2007).

The second discourse-related characteristic of the practice-based research of teachers is *public scrutiny and critique*. An important aspect of practice-based research is that it be made public and thus open to peer-review and inspection by possible users.

The two characteristics related to the *research methods* in teachers' practice-based research were not considered further here as these are considered in much greater detail when we turn to the quality of teachers' practice-based research activities (see next section).

In the literature, several models with approximately the same content have been put forth to guide the process of designing teachers' practice-based research (Burton & Bartlett, 2005; Hubbard & Power, 1993, 1999; Lankshear & Knobel, 2004; Mills, 2000; Ponte, 2002c). Commonly mentioned activities are, for example, the planning of the research project, data collection and data analysis. Verschuren (2009b) makes a useful subdivision of these activities into three phases, namely: the (a) conceptual phase, (b) technical phase and (c) implementation phase. The conceptual phase (or the context of discovery) of practice-based research can be divided even further into identification of the practical problem to be solved and, related to this, the knowledge problem. The technical phase (or the context of justification) tells us how the research, divided in several stages, will be conducted. Finally, the implementation phase (or the context of implementation) specifies how the knowledge gained from the practice-based research can be applied to solve the starting (i.e., practical) problem.

3.2.2 PROPOSED QUALITY STANDARDS FOR PRACTICE-BASED RESEARCH

Several authors have proposed criteria or standards for teachers' practice-based research activities (Altrichter et al., 1993; Anderson & Herr, 1999; Copabianco & Feldman, 2006; Elliott, 2007; Oancea & Furlong, 2007; Verschuren, 2009a, 2009b). Verschuren (2009a, 2009b) makes a distinction between scientific standards (i.e. whether the knowledge produced by the research is true) and usefulness standards (i.e. the utility of the research results for actual practice). According to Verschuren a balance must typically be struck in finding a context-specific optimum between those scientific and usefulness standards.

With regard to the scientific standards, Verschuren (2009a; 2009b) has specified the following four: *internal validity* (i.e., the reliability and accuracy of the research results for the phenomena being studied)*, external validity* (i.e., the generalizability of the findings – resulting from a unique local context – to other contexts with different practitioners)*, accountability* (i.e., the verifiability and thus clarity of the research design and report) and, finally, *cumulativity* (i.e., the building of one's findings and/or knowledge on prior findings and knowledge).

With regard to the usefulness standards or 'implementation validity', Verschuren (2009a; 2009b) highlights the following four: *comprehensibility* or the accessibility and understanding of the results and the way in which they were produced*; acceptance* or, in other words, recognition of the relevance of the research results and as representing valid values, beliefs, opinions, needs and demands; *legitimacy* or perception of the knowledge and the manner in which it was attained as justifiable; and *learning opportunities* or the delivery of clues, suggestions and tools for implementation and/or learning. The quality standards for usefulness are strongly connected to the needs of those with a stake in the practice-based research and/or the target population. According to Verschuren (2009b), "these needs result from the fact that the stakeholders or members of the target population themselves often must do something with the knowledge that is being produced" (p.20). This means that for practice-based research to be of value, teacher-researchers must pay attention to the usefulness standards and needs of the stakeholders.

3.2.3 THE PROFESSIONAL GROWTH OF TEACHER-RESEARCHERS

Practice-based research as a professional development activity provides both student teachers and practicing teachers with ongoing opportunities to actively develop their professional knowledge and skills related to their professional practice (Guskey, 2002). Prerequisite for such development, are teachers' positive attitude towards this research activity (Kirkpatrick & Kirkpatrick, 2006) and the appreciation of its benefits (Kincheloe, 2003). Both positive attitude and perceived benefit can influence the extent to which teachers experience their research role as meaningful and the extent to which they learn from the research. Learning is understood here as a change in teachers' cognitions — including their beliefs — and/or their behavior (Zwart, Wubbels, Bergen, & Bolhuis, 2007). Guskey (2002) has claimed that teacher cognitions change as their practices change and they reflect on the outcomes of these changes. Guskey's Model of Teacher Change challenged the idea that beliefs must change before changes in practice can occur. With the Interconnected Model of Teacher Professional Growth (IMTPG), moreover, Clarke and Hollingsworth (2002) expanded on Guskey's model and conceptualized the learning process as cyclic and ongoing with multiple entry points. This model is depicted in Figure 3.1 and briefly explained below.

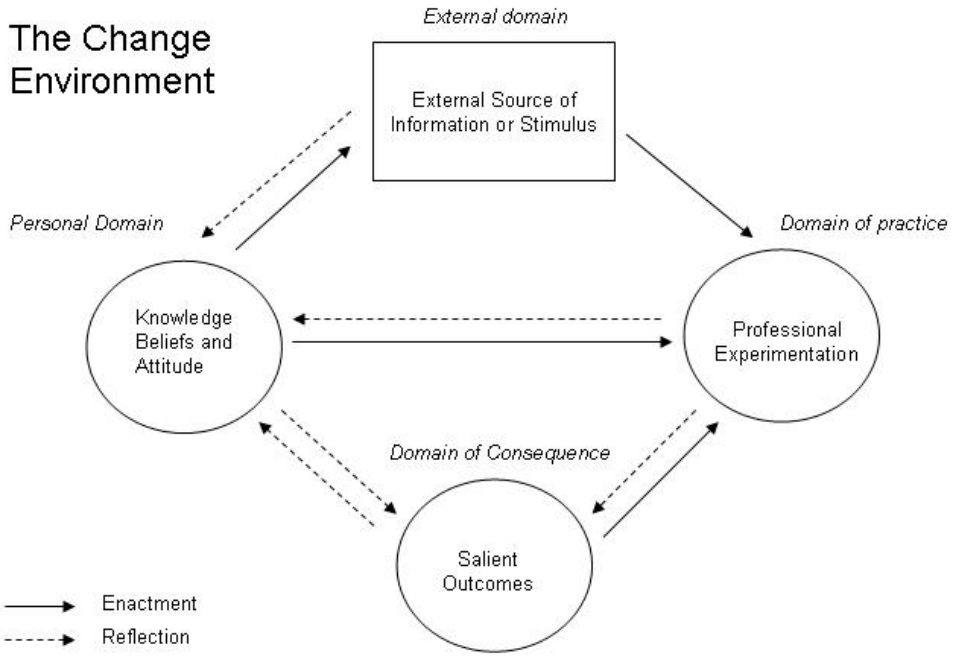


Figure 3.1: *Interconnected Model of Teacher Professional Growth (Clarke & Hollingsworth, 2002, p.951)*

According to the IMTPG of Clarke and Hollingsworth (2002, p.950), teacher change occurs in four distinct domains which constitute the teachers' professional world: *the personal domain* (PD) which includes teacher knowledge, beliefs and attitudes; *the domain of practice* (DP) which includes professional experimentation; the *domain of consequence* (DC) which includes the inferred salient outcomes; and the *external domain* (ED) which includes sources of information, stimulus or support. The external domain differs from the other three domains in that it is located outside the teachers' personal world. The other three domains taken together constitute the teacher's professional world and encompass their professional actions, the inferred consequences of those actions and the knowledge and beliefs which prompted those actions and arose from the actions (p. 951).

Clarke and Hollingsworth (2002) underline the usefulness of the IMTPG to evaluate the outcomes of professional learning opportunities. In the present study, we therefore adopt the model to describe the perceived professional growth of teacher-researchers. In doing this, we first divided the personal domain and the domain of practice into learning and behavior change related to the teacher's research role versus the teacher's teaching role. This allowed us to compare their development in the different roles. Second, we examined the salient outcomes

within the domain of consequences for different individuals within the school organization, including other teacher-researchers (e.g., learning new research methods, learning about analyzing research data), pupils (e.g., improved learning results, increased motivation) and teaching colleagues (e.g., improved lesson materials, new teaching strategies). Clarke and Hollingsworth (2002) considered only salient outcomes for the teacher point of view. Given our interest in teachers' professional growth as a result of the conduct of practice-based research, we considered salient outcomes at all levels of the school organization.

3.2.4 RESEARCH QUESTIONS

In the present study, the characteristics of teachers' practice-based research projects, the quality of the research activities performed by the teacher-researchers and the perceived learning outcomes resulting from these research activities, were explored. The following three research questions were investigated:

1. What features characterize the practice-based research of teachers?

2. To what extent are quality standards present in the reports of the practice-based research conducted by the teachers?

3. What learning outcomes do the teachers perceive following their practice-based research?

3.3 METHOD

3.3.1 SELECTION OF THE CASES

To investigate the research questions, two secondary education schools from two different professional development school partnerships in the Netherlands were asked to participate in the study. The schools were comprehensive schools. Both schools were selected for participation following an exploratory study in their partnerships on the realization of teacher research within the collaborating schools. The two Professional Development Schools aimed to realize a supportive and stimulating research environment within the school organization. Both schools were

comparable with regard to their progress with the implementation of teacher research as an educational innovation. At the moment of participation, several teacher research projects had been completed at both schools.

A coordinating person for each school was asked to provide an overview of all the teacher research projects completed at the school. About 10 teachers out of 120 and 100 teachers for the two schools respectively had carried out some practice-based research. Six completed practice-based research projects (three from each of the two schools, N=6) were included in the present study.

For each of the six selected research projects, a research report was available. The relevant teacher-researchers also agreed to be interviewed with regard to their practice-based research projects and their perceived learning outcomes. All of the participating teacher-researchers were experienced teachers working in different educational domains. At the first school, two female and one male teacher-researcher participated; at the second school, one female and two male teacher-researchers participated. The six teachers did not have experience with the conduct of practice-based research activities. In Table 3.1, an overview of the six different research cases and the two data sources are presented.

Table 3.1

Overview of details for respondents and two sources of data

Partnership and school	Teacher-reseacher[1]	Sex	Topic	Data sources	
				Research report	Interview
Partnership I School A	Case 1 – Mary	Female	English language	63 pages	44:22 minutes
	Case 2 – Lynn	Female	French language	20 pages	37:07 minutes
	Case 3 – Peter	Male	Dutch language	34 pages	44:11 minutes
Partnership II School B	Case 4 – Jane	Female	History	16 pages	41:00 minutes
	Case 5 - Kevin	Male	Geography	42 pages	33:34 minutes
	Case 6 - James	Male	Chemistry	96 pages	42:03 minutes

[1] *Names are fictional*

3.3.2 PROCEDURE AND ANALYSES

To answer the research questions, two sources of information were used: (a) the practice-based research reports from the teacher-researchers and (b) transcripts of semi-structured interviews conducted with the teachers with regard to their practice-based research activities and the perceived learning outcomes of their practice-based research experiences (see Table 3.1). To identify the characteristics of the teachers' practice-based research projects and thus answer the first question, both sources of data were analyzed. To determine the quality of the teachers' practice-based research and thus answer the second question, only the research reports were analyzed. To determine the perceived learning outcomes of the practice-based research projects and thus to answer the third question, only the transcripts of the semi-structured interviews were analyzed. Separate analytic (i.e., coding) tools were developed for each set of analyses.

CHARACTERISTICS OF THE PRACTICE-BASED RESEARCH OF TEACHERS

To identify the characteristics of the six practice-based research projects, a qualitative coding scheme (Miles & Huberman, 1994) reflecting the following six of the eight categories distinguished by Cochran-Smith and Lytle (2009) was developed: with regard to the content the 'aim of practical knowledge construction' and the 'aim of improving educational practice'; with regard to the context 'ownership of the research question' and 'embeddedness in professional practice'; and with regard to the discourse function 'community and collaboration' and 'public scrutiny and critique'. Information regarding the six characteristics was drawn from both the practice-based research reports and the interview transcripts. The information regarding the content and context characteristics of the teachers' practice-based research came mainly from their research reports. The information regarding the discourse function of the teachers' practice-based research came mainly from the interview transcripts and particularly those portions where the teachers were asked about collaboration and the sharing/discussion of their research and results with colleagues.

Following analysis of one research project for its characteristics by the first author, a second researcher analyzed the same research project. The two analyses were then compared and found to be highly comparable, which meant that the coding scheme did not have to be adapted. The first author then coded the characteristics of the remaining five research projects. The characteristics of the six practice-based research projects were then compared for similarities and differences.

STANDARDS FOR TEACHERS' PRACTICE-BASED RESEARCH

On behalf of answering the second research question, a rating-system for analyzing the quality of teachers' practice-based research process as perceptible in their research reports, was developed. The rating system was constructed following an iterative procedure.

First, (a) theoretical models for systematic teacher research and methods of social scientific research were considered and (b) practical insights from the assessment frameworks used for practice-based research at different teacher education institutes were examined. On the basis of this information, a list of possible research activities for each of the three phases in teachers' practice-based research was developed. The phases reflect the conceptual, technical and implementation phase distinguished for practice-based research by Verschuren (2009a; 2009b). High quality teacher research was assumed to include all of the practice-based research activities, and with that, the notification of the results in the research report. Next, one or more of the scientific and usefulness standards distinguished by Verschuren (2009a, 2009b) was linked to each practice-based research activity included in the list. Subsequently, the standards were operationalized with regard to their possible manifestation in a high quality teacher research report and quality criteria thus formulated: How would this research activity and associated standard manifest itself in high quality teacher research?' (See Appendix 1 for examples). Finally, three degrees of presence were defined for the quality criteria: missing (i.e., failure to perform the specific activity), present but not yet satisfactory (i.e., unclear parts, missing parts, limited performance) or present and satisfactory (i.e., conform standard for specific activity).

During all stages in the development of the rating system, discussion rounds with the other authors (peer debriefing) were organized to validate the decisions being made and procedures being followed. After the initial version of the rating system was completed, an exemplary research report was analyzed (a research report from a teacher-research not included in this study), mainly as a test for measurability and formulation. The results of this preliminary analysis were discussed with the members of the research group. Thereupon, vulnerabilities in the rating system's construction were corrected, resulting in the final version of the rating system.

To determine the reliability of the analyses, the first author and a trained second researcher analyzed — independent of each other — one of the randomly selected research reports using the rating system. The analyses were compared and discussed until consensus could be reached. On the basis of this discussion, the following adjustments were made: a few of the quality criteria were formulated

differently (more precisely) and one quality criterion was omitted due to overlap with another (i.e., 'exploring the implications/meaning of the research problem' overlapped with 'exploring the occasion of the research problem' and was therefore omitted). The final rating system is presented in Appendix 1.

The practice-based research reports from the six teachers were scored using the established quality criteria and rating system. The results for the six reports were then compared.

TEACHER-RESEARCHERS' PERCEIVED LEARNING OUTCOMES

To determine the learning outcomes for the practice-based research conducted by the teachers, a semi-structured retrospective interview-guide was developed. The interview-guide consisted of a series of open-ended questions covering the domains of change in the Clarke and Hollingsworth (2002) Interconnected Model of Teacher Professional Growth. During the interviews, the teachers were asked about their professional growth in the personal domain; the domain of practice; the domain of consequence; and the external domain (see descriptions above). For both the personal domain and the domain of practice, the teachers were explicitly asked about any changes from the viewpoints of doing practice-based research (*research changes*) and their functioning in educational practice (*teaching changes*). Sample questions for the *personal domain* were: 'Did your attitude with respect to practice-based research change as a result of the research you carried out?' and 'What did you learn (improved knowledge, changed attitudes/beliefs) with respect to your own teaching practice as a result of carrying out your practice-based research?'. Sample questions for the *domain of practice* were: 'Did you change your behavior as teacher as a result of what you learned through researching your own practice?' and 'Can you give concrete examples of this changed behavior?' In the *domain of consequence*, teachers were asked for inferred salient outcomes in the school organization. Example questions are 'What effects are visible of your learning and changed behavior with respect to pupils?' and 'With respect to colleagues?' Finally, the teachers were asked about external influences such as sources of information, stimulation and support during their research projects. Sample questions in the *external domain* were: 'Did you learn from colleague teacher-researchers during your research project?' and 'Can you give concrete examples of what you have learned?' The interviews were all conducted by the first author at the respective schools of the teachers and audio recorded with the teachers' consent. The interviews were then transcribed verbatim.

To explore the learning outcomes of teachers' participation in practice-based research, a coding scheme was developed to analyze the interview transcripts (Miles & Huberman, 1994). The four domains of change identified by Clarke and Hollingsworth (2002) and the teachers' perspectives on (a) research and (b) teaching within particularly the personal domain and the domain of practice were taken at the starting point for doing this. The interview responses of the teachers were linked to the four domains of change and research/teaching viewpoints. Grounded in empirical data, several subcategories of learning outcomes present in the interview responses were next identified for each of the domains of change. New subcategories were added until all six interviews had been analyzed. The identified subcategories were discussed with the other authors, and a coding scheme was agreed upon. 'Development of a positive research attitude,' for example, was coded as pertaining to the *personal domain: research*. 'Involvement with the school's educational policy (new tasks)' was coded as pertaining to the *domain of practice: teaching*. 'Consequences for colleagues' was coded as pertaining to the *domain of consequences*. And 'influence of mentoring others' practice-based research' was coded as pertaining to the *external domain*. In order to establish reliability of the analysis, the first author and a second researcher analyzed – independent of each other – one of the randomly selected interviews. The analyze results were compared and discussed by the two researchers. The coding of the transcripts appeared to be reliable. Nevertheless, significant overlap was detected between two subcategories — namely, 'development of a positive research attitude' and showing of a critical research attitude'; these were therefore merged into a single category: 'development of a research attitude.'

After finalization of the coding scheme, all interview transcripts were analyzed by the first author. The results for the six teachers and their practice-based research projects were then compared.

3.4 RESULTS

3.4.1 CHARACTERISTICS OF TEACHERS' PRACTICE-BASED RESEARCH

In Table 3.2, an overview of the characteristics of the six practice-based research projects considered in this study is presented.

Table 3.2

Characteristics of six practice-based research projects

Characteristic	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Aim of practical knowledge Construction *(content)*	Gain insight into conditions for implementing a new course	Gain insight into pupils' learning results when different reading strategies are taught	Gain insight into pupils learning results as a result of changed literacy education	Gain insight into pupil perceptions in an innovative context	Gain insight into the collaboration of six teachers with different teaching topics in one educational project	Gain insight into effects of a educational innovation of the motivation of pupils
Aim of improving educational practice *(content)*	The implementation of a new course and development of new educational materials	Improve pupil learning with use of new reading strategies	Improve pupil learning via a new method for literacy education	No visible improvements	No visible improvements	Improving pupils' motivation through the application of new teaching strategies
Ownership of the research question *(context)*	Question of the school	Own question (supported by colleagues)	Own question	Unclear ownership	Unclear ownership	Own question
Embeddedness in professional practice *(context)*	Related to own expertise but not embedded in current educational practice	Embedded in own educational practice with focus on own teaching topic	Embedded in own educational practice with focus on own teaching topic	Related to own expertise but not embedded in current educational practice	Object of the research, as one of the six concerned teachers in the project	Embedded in own educational practice with focus on own teaching topic
Community and collaboration *(discourse function)*	Research alone, intervention as part of a project together with colleagues and two student teachers	Alone	Alone	In the beginning together with a colleague as a 'critical friend' and with the support of the learning community	Together with a colleague as a 'critical friend' and with the support of the learning community. Supervision of the research of a student teacher	Alone with the support of the learning community. Supervision of the research of a student teacher
Public scrutiny and critique *(discourse function)*	Research plan shared with colleagues. Presentation in the school for colleagues. A final research report and article to inform	Presentation in the school for colleagues. A final research report. Informing colleagues about research progress	Presentation method in literacy section in the beginning, later on just informing the Dutch language section. A final research report to inform	Sharing research with learning community and critical friends. A final research report and presentation for colleagues and school leaders	Sharing research with learning community and critical friend. A final research report and presentation for colleagues and school leaders	Sharing research with learning community and critical friend. A final research report and presentation for direct colleagues

Looking at the *content* characteristics of the six research projects (i.e., aim of practical knowledge construction, aim of improving practice), three of the six research projects were mostly aimed at improving one's own educational practice by gaining knowledge of new teaching methods. One of the projects was aimed at the development of a new course and new educational practices for the course. Two of the projects were aimed at gaining insight into a 'school issue' and thus knowledge production. These projects led to recommendations.

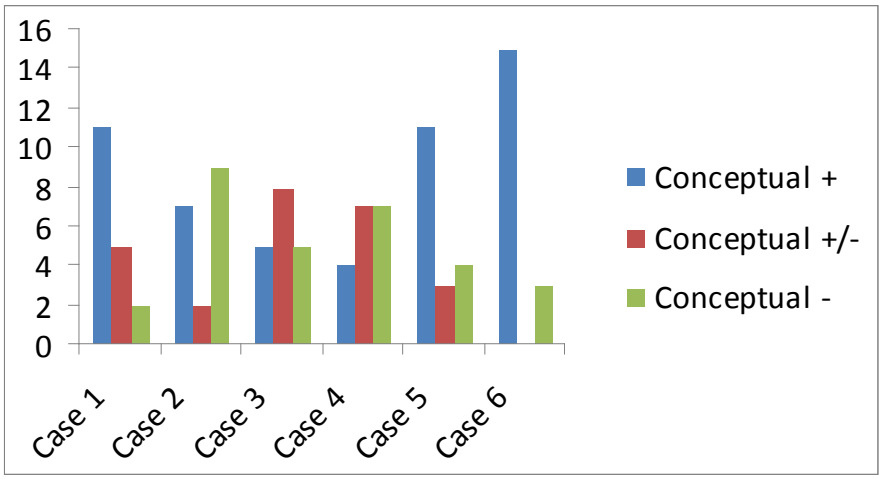
With regard to the *context characteristics* of the six research projects (i.e., ownership of the research question, embeddedness in professional practice), the questions addressed in four of the research projects originated directly from practical 'problems' or 'issues' confronting the teachers in their own classrooms or from their experience with teaching pupils. These teacher-researchers therefore clearly owned the research projects. For the other two research projects, it was difficult to determine the degree of ownership because there was a school concern behind the projects.

Regarding the *discourse function* of the teachers' practice-based research projects (i.e., community and collaboration, public scrutiny and critique), the projects were found to differ widely. Two of the projects were carried out by the teacher-researchers alone without peer review or support of colleagues and their research (findings) was only shared after completion of the project. A third project was also carried out by the teacher-researcher alone but in a setting where the research and research experiences were discussed with peers in a broader learning community both during and upon completion of the project.

Two other research projects were conducted by the teacher-researchers with the support of a critical friend and in a learning community setting. Recommendations based on the outcomes of these two research projects were presented after completion of the projects to colleagues and school leaders. In the sixth research project, the actual research was done alone by the teacher-researcher but the intervention was developed together with two colleagues.

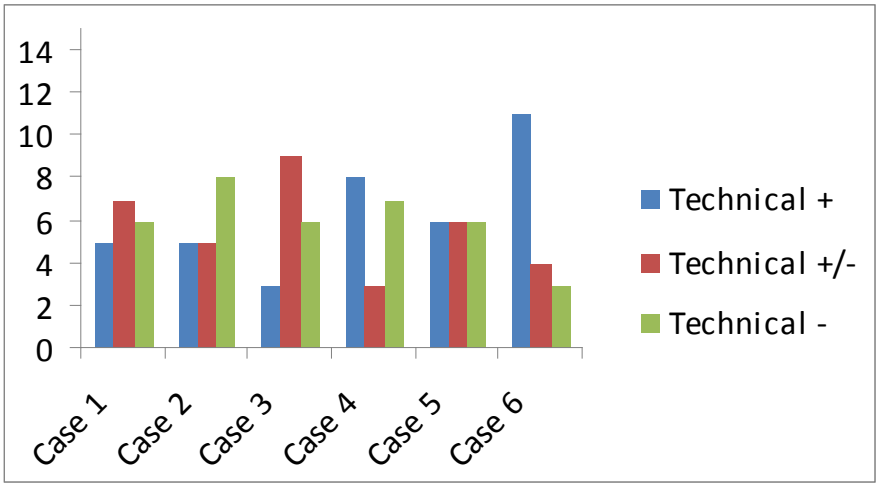
3.4.2 STANDARDS FOR TEACHERS' PRACTICE RESEARCH ACTIVITIES

In Figure 3.2a, 3.2b, and 3.2c, the overall ratings of the teachers' practice-based research activities during the conceptual, technical and implementation phases are presented. Below, the results regarding each research phase are described in more depth.



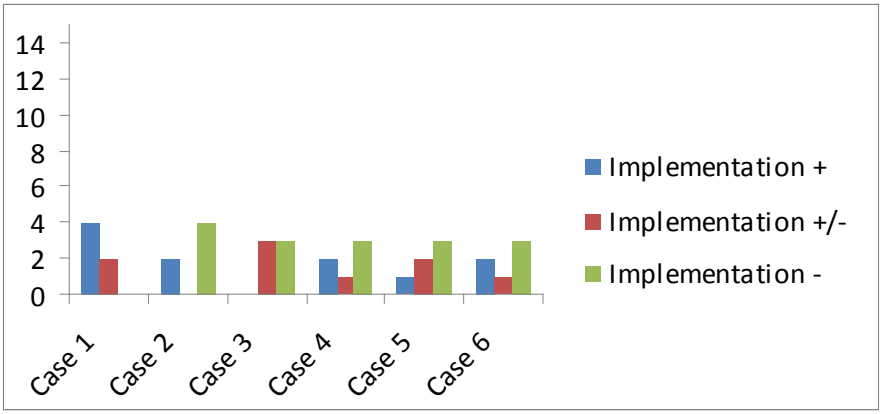
Note: Conceptual (max. 18 standards)
Note: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance, (+) Present and satisfactory (conform standard)

Figure 3.2 a: *Quality ratings of reported research activities: Conceptual phase*



Note: Technical (max. 18 standards)
Note: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance, (+) Present and satisfactory (conform standard)

Figure 3.2 b: *Quality ratings of reported research activities: Technical phase*



Note: Implementation (max 6 standards)
Note: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance, (+) Present and satisfactory (conform standard)

Figure 3.2 c: *Quality ratings of reported research activities: Implementation phase*

THE CONCEPTUAL PHASE OF TEACHERS' PRACTICE-BASED RESEARCH

The score for satisfactory performance during the conceptual phase of the teachers' research projects varied from 4 to 15 with a mean 8.83 (maximum possible score of 18) (see Figure 3.2a). All of the teacher-researchers explored the occasion of their research problems to some extent. However, this exploration was often restricted to their own educational practices. Other research activities related to external validity (e.g., generalisability of their research projects) and the acceptance of the research by others such as determining the scope of the research, defining expected outcomes and considering possible implications, were hardly visible in the research reports. Research activities such as clear and precise formulation of the problem and the research question(s) were difficult for the teacher-researchers. The often 'sloppily' formulated research questions were nevertheless most times functional, consistent, and reflected the underlying research problem. The theoretical foundations for the practice-based research projects were mostly restricted to one theoretical insight — often from a single reference — which was not always current or supported empirically. And when more than one theoretical insight was mentioned and/or multiple prior findings were reported, they were not always integrated with each other.

THE TECHNICAL PHASE OF TEACHERS' PRACTICE-BASED RESEARCH

The score for satisfactory performance during the technical phase of the teachers' research projects varied from 5 to 11 with a mean 6.83 (maximum possible score of 18) (see Figure 3.2b). The teacher-researchers had difficulties making clear what they did and why they did it the way they did it. In fact, the methods and procedures for the collection of the data and analyses of the data (or important parts) were often missing. Also, the establishment of the methods was often not explicitly described and the reasons for certain choices were frequently not mentioned. All of the teacher-researchers considered multiple manners of dissemination for their research findings. Some statements about the reliability and validity of the research methods they used were also sometimes included in the research reports, but none of the statements were judged to be satisfactory because they were either incomplete or unsystematic. Almost none of the teacher-researchers considered alternative (existing) data collection or analytic methods developed by others. Finally, the teacher-researchers presented the results of their practice-based research and their conclusions quite well, but they rarely compared their findings to those of others or previous findings.

THE IMPLEMENTAL PHASE OF TEACHERS' PRACTICE-BASED RESEARCH

The score for satisfactory performance during the implementation phase of the teachers' research projects varied from 0 to 4 with a mean of 1.83 (maximum possible score of 6) (see Figure 3.2c). The teacher-researchers rarely articulated the implications/consequences of their research results for themselves or for others. They rarely explained the actions to be taken as a result of the findings or even considered these. And they seldom made suggestions for how proposed actions might be undertaken. All but one of the teacher-researchers nevertheless formulated new or follow-up research activities and questions. Some teachers reflected to some extent upon the research process (e.g., difficulties encountered, what went wrong or impossibilities) but not in detail or in depth.

3.4.3 TEACHER-RESEARCHERS' PERCEIVED LEARNING OUTCOMES

In Table 3.3, teachers' perceived learning outcomes following their conducted practice-based research projects for the different domains of possible change are presented.

Table 3.3

Perceived (learning) outcomes following teachers' practice-based research

Perceived outcomes	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Regarding practice-based research (Personal domain)						
Development of a research attitude	X	X	X	X	X	X
Learning about 'research'(knowledge & skills)	X			X	X	X
Learning about discussing and sharing research experiences						X
Learning about mentoring research activities	X			X	X	X
Regarding own educational practice (Personal domain)						
Changed views on (own) educational practice						X
Changed views on teaching profession and professional identity						X
Awareness of own actions/ educational practice		X			X	X
Learning about pupils			X			X
Learning about (own) educational practice (subject teaching)		X	X			X
Learning about in-school change processes					X	X
Regarding practice-based research (Domain of practice)						
Mentoring (student) teachers' practice-based research activities	X				X	X
Designing/ developing research activities for pupils	X			X	X	
Considering mentoring pupils' research activities					X	
Regarding own educational practice (Domain of practice)						
Conscious acting differently in educational practice	X	X	X		X	X
Considering (own) educational practice					X	
Involvement with schools' educational policy (new tasks)					X	X
Consequences (Domain of consequence)						
For pupils	X	X	X	X		
For colleagues	X	X	X			X
For student teachers / teacher-researchers	X					X
For the school organization (educational policy)	X					
Sources of information, stimulus or support (External domain)						
Influence of others' practice-based research	X			X	X	X
Influence of mentoring others' practice-based research						X
Influence of preparing 'mentoring research workshops'						X
Influence of discussing research mentorship						X

Note: No mark means no teacher statement; X means teacher statement

THE PERSONAL DOMAIN

With regard to the topic of *research*, all of the teachers reported having developed a more positive attitude toward research or confirmation of an already positive attitude. Two of the six teachers did not mention any other personal changes with regard to research. The other four teachers reported having developed increased knowledge and skills for the conduct of practice-based research (e.g., the steps and planning required, use of instruments, reporting the research) and for the supervision of research projects. One teacher indicated having learned about the discussion and sharing of research experiences.

With regard to the topic of *teaching*, two of the teachers did not mention any learning or professional development. Three of the teachers mentioned becoming more aware of their own actions and educational practices in addition to learning about their own practices (including subject teaching). Two teachers also mentioned learning about their pupils (e.g., pupil learning and motivations) and in-school change processes (e.g., better understanding of the difficulties of realizing specific innovations within the school organization). One teacher mentioned changed views on his professional identity and on teaching in general and his own educational practice in particular in addition to the outcomes already mentioned in the preceding.

THE DOMAIN OF PRACTICE

With regard to the topic of *research*, two teachers did not mention any behavioral changes with regard to the conduct of practice-based research. Three teachers mentioned having developed more research activities for their pupils with one of these teachers actually considering mentoring pupils' research activities as a result of the teacher's own experiences. Three of the teachers mentioned changed practices with regard to the supervision of their own student teachers' practice-based research as a result of their research experiences (e.g., better supervision with regard to the steps in the research process, more attention to reflection, adoption of a 'critical friend' approach during the research process).

With regard to the topic of *teaching*, all but one teacher mentioned being more aware of their teaching practices and, therefore, acting differently (e.g., adopting different teaching, supervision and learning strategies with their pupils, and adjusting higher requirements for pupils). In addition, two teachers mentioned an increased willingness to take on new tasks (e.g., increased involvement in the school's educational policy). Last, one teacher mentioned increased consideration of own educational practice as a behavioral change.

THE DOMAIN OF CONSEQUENCES

Four of the six teachers mentioned changes for pupils (e.g., improved learning results and quality of pupil research projects, and more positive research attitudes) as well as for colleagues at school (e.g., adoption of educational materials and/or procedures by colleagues). Two of the teachers mentioned acknowledgment of the research experiences by other teacher-researchers and student teachers as a learning outcome (e.g., experiencing similar problems or feelings during practice-based). One teacher also mentioned clear ramifications of the practice-based research results for the school organization and school policy: the establishment of a new teaching course.

THE EXTERNAL DOMAIN

Four teachers spoke of the practice-based research projects of others influencing their own professional development. The exact content of this influence was not specified, however. In addition to this general research influence, one teacher also spoke of gaining insight and developing professionally as a result of the supervision of others' practice-based research projects, the preparation of research workshops and discussion of the supervision of others' practice-based research.

3.5 CONCLUSIONS AND DISCUSSION

In this study, the characteristics and impact of teachers' practice-based research was studied in two PDSs. The study should be considered as a first step in this direction, as it was limited to the research practice of six teacher-researchers, and only examined the earliest period of having teachers conduct practice-based research in PDSs in the Netherlands.

Two conclusions can be drawn with regard to the characteristics of the teachers' practice-based research projects. First, the results for the context and content characteristics of the six practice-based research projects showed those projects which were clearly embedded in the teachers' own educational practices and those projects which thus started from the teachers' own research questions to bring about perceptible improvements such as changed procedures, materials or didactics. Practice-based research which was policy oriented only produced recommendations and thus no improvement. As both Elliott (2008) and Day (1999) have argued, self-determination and autonomy (i.e., ownership) are key aspects or hallmarks of professional behavior. Second, the discourse characteristics of the

teachers' practice-based research projects and thus the PDS contexts differed considerably. Some of the teachers perceived their research environments as more supportive and having more possibilities for peer review, collaboration, exchange of research experiences and discussion than others. This result confirms the findings of previous research (see chapter 2). In present study, all of the research projects were individual projects, often with little or no collaboration, sharing of experiences, and opportunity for discussion or peer review. The question is whether schools in general and PDSs in particular are aware of the supportive structures which teacher-researchers should have to conduct high-quality practice-based research and whether the means and resources are available for the schools to realize such a supportive structure.

With regard to our second research question concerned with the quality of the practice-based research conducted by the teachers, their research reports showed this to be frequently less than satisfactory. This is in line with the findings of Zeichner and Noffke (2001) who also found the research which teachers conduct in schools to not be at an acceptable level. Zeichner and Noffke (2001) mention teachers not being trained to conduct research and being generally unfamiliar with such basic research techniques as reviewing the literature and moving in a professional social network with colleagues (whether or not researchers) for peer reviewing and receiving feedback. The issue that then arises is whether teachers can be trained well enough in light of today's limited resources and teachers' primary task, namely educating pupils, to conduct high-quality, practice-based research in schools. Also making the quality of their practice-based research visible for others, appeared to be difficult for teachers.

With respect to our third research question, the interviews showed teacher-researchers perceived different learning outcomes, which, most times, remained to be mostly close to the teachers themselves (e.g., changed attitudes, increased awareness, changed acting). If possible consequences and/or changes for the educational practices of others were mentioned as an outcome or implication of the teachers' practice-based research, these were quite limited and generally formulated. High-quality, practice-based research does not, thus, mean immediate change or direct improvement of educational practice: teachers need also to be able to change their practices on the basis of their own research findings and experiences.

3.5.1 SUGGESTIONS FOR THE PROMOTION OF PRACTICE-BASED RESEARCH

The results of this study have several implications for the realization of practice-based research through teacher-as-researchers in PDSs. We consider three here.

First, the six teacher-researchers in our study devoted considerable effort to the conduct of their practice-based research but our results show the realization of high-quality research to be difficult for the teachers. Teachers should therefore be better equipped for the conduct of high-quality practice-based research and the transfer of their research results to improve their educational practices, and for gaining insight into their own learning and research processes. The coding instruments developed in the present study can help guide the teacher-researchers with information on, for example, the design and conduct of research and tips for effective research reporting.

A second implication for the future realization of practice-based teacher research stems from our finding that teacher-researchers only provide limited insight into the implications of their research outcomes for others. As a result, desired improvements and changes are mostly not achieved. In order to realize changed educational practices and school improvements, teacher-researchers should thus pay more attention to the external validity of their research projects throughout the entire research process. They should spell out the implications of their research results and learn to state what actions need to be taken for their research findings to be implemented and applied in actual practice.

Finally, to prevent low quality teacher research in the future, teacher-researchers should learn to make the research endeavor more visible than is currently the case. This means explaining what they are doing or have done, why they are doing it or have done it and communicating this to others (i.e., peers). This should provide not only greater and better insight into the ongoing research process but also help the teachers guide their own research endeavor.

3.5.2 SUGGESTIONS FOR FUTURE RESEARCH

In present study, we have developed reliable and valid coding instruments for the analysis of teachers' practice-based research in PDSs. While the teachers' research reports are an important source of information, it can be asked if the reports adequately represent the details of their research endeavors. It is conceivable that the teachers conducted high-quality, practice-based research but simply did not

report this adequately. Alternatively, it can be imagined that teachers described their research results more positively than the research allows. In other words, teachers' research reports may be susceptible to bias and the question is to what extent their research reports are valid representations of their research activities.

In the present study, teacher-researchers were asked for their perceived professional growth following their participation in practice-based research. The teachers may overestimate their professional growth as differences between people's actions and perceptions can exist. Cohen (1990) has observed 'teachers sometimes say they have been changed, but, in fact, their practice does not change at all'. Implicit, unconscious learning is also not likely to be elucidated in interview responses (cf. Eraut, 2004). Also, the period of investigation in our study was short and the practice-based research programs are relatively new, while changes in behavior are known to take time and effort (Guskey, 2002).

In future research, the use of semi-structured interviews and research reports to study the effects of practice-based research involvement on the professional development of teachers should be supplemented with other research methods such as observations and tests and other criteria such as improved pupil learning or the contribution to school development.

The analyses in this study were conducted for each research question separately. Our impression, however, is that the *type* of research undertaken by the teachers and particularly the *quality* of the research undertaken by the teachers are closely related to their *learning outcomes*. Future research should thus investigate the *interrelations* between the characteristics of teachers' practice-based research, the quality of their practice-based research and the learning outcomes resulting from practice-based research.

CHAPTER

4

THE ADDED-VALUE OF PROFESSIONAL DEVELOPMENT SCHOOLS FOR TEACHERS' PRACTICE-BASED RESEARCH[6]

ABSTRACT

In-school practice-based research is increasingly seen as a potentially powerful activity for the professional development of experienced teachers and the training of student teachers. Professional development schools (PDSs) have been established to realize supportive and stimulating environments for practice-based research activities for both teachers and student teachers. The question investigated in this study concerns the added-value of these in-school research environments. For this purpose, the perceptions of teachers and student teachers involved in research (N=102) regarding practice-based research were compared between PDSs and non-PDSs settings by means of a questionnaire, the Questionnaire on Teacher Research (QTR). In this questionnaire, respondents were asked for their perceptions of the research environment, their research motives, the research process (conducted research activities and satisfaction with these activities), and the perceived outcomes of their practice-based research projects. Results showed that all PDS teachers perceived the contextual aspects, the research process and their research attitudes and efficacy beliefs as a research outcome statistically significantly more positive than non-PDS teachers. These results provide support for the claim that PDSs positively affect teachers' experiences with and perceptions of practice-based research.

[6] This chapter has been submitted in adapted form as:
Vrijnsen – de Corte, M., den Brok, P., Kamp, M., & Bergen, T. *The added-value of professional development schools for teachers' practice-based research.*

4.1 INTRODUCTION

In-school practice-based research is commonly seen by scholars as an important activity for the professional development of both experienced and prospective teachers (Cochran-Smith & Lytle, 2009; Zeichner & Noffke, 2001). It is expected that teachers who investigate practical problems and examine questions resulting from their own daily practice actively construct knowledge about or gain insight into their own or shared educational practice (Cochran-Smith & Lytle, 1999a; Fenstermacher, 1994). It is assumed that via practice-based research teachers can more effectively improve their educational practices, which ultimately will lead to improvement of pupil learning as well as school development.

Both student teachers and experienced teachers have to acquire the teacher-researcher role, which differs from their regular teaching role. Often, they have little prior experience with in-school practice-based research. Experienced teachers can perform research activities in their schools and use practice-based research for their own continuous embedded professional development and improvement of their educational practice. To stimulate student-teachers' reflection, practice-based research has an important position in the curriculum of most teacher education institutes, internationally as well as in the Netherlands, the context of this study.

In the USA as well as in West-European countries, *Professional development schools* ('PDSs') have been created to support and stimulate in-school research environments for teachers' practice-based research (Darling-Hammond, 2005; Teitel, 2003; The Holmes Group, 1990). These PDSs work together in partnerships with other primary or secondary education schools and/or (professional and/or academic) institutes for teacher education. The aim of these PDSs is to create an environment in which the learning of student teachers (including the teacher-researcher role) is supported by settings in which they enter professional practice by working with expert practitioners, and where experienced teachers are enabled to renew their own professional development by carrying out practice-based research and assume new roles such as supervising student teachers with their teaching and research (Darling-Hammond, 2005). In these schools, student teacher learning, experienced teachers' professional development and in-school practice-based research activities are connected with the purpose of improving educational practice and realizing school development.

During the last years, several primary and secondary education PDSs were established in the Netherlands with funds from the government. The focus on practice-based research in these PDSs differs fundamentally from 'non-PDSs', in which practice-based research is carried out mostly by student teachers as required part of their teacher training curriculum and occasionally by experienced teachers. In these non-PDSs, supportive conditions for performing practice-based research activities are not obvious. An interesting question, both for researchers and policy makers in the Netherlands and elsewhere is whether the investment in PDSs has added value when it comes to the professional development of teacher-researchers and student teachers, and, ultimately, for the learning outcomes of pupils. Prior studies comparing PDS and non-PDS settings have focused mainly on the education of prospective teachers in these settings or on the implementation of specific characteristics and features of the PDS, without specifically investigating the added-value of the practice-based research part (Castle et al., 2006; Clark, 1999; Reynolds, Ross, & Rakow, 2002; Ridley et al., 2005). In the present study, differences in perceptions regarding practice-based research, the environment created for research and the outcomes of such research between (student) teachers of PDSs and non-PDSs were investigated. These perceptions were measured by means of a questionnaire, developed with findings of two earlier studies conducted by the authors (see chapter 2 and 3). These studies showed several contextual elements to be important for the realization of successful practice-based research through teachers in PDSs, such as supportive leadership and a research-favorable school culture. These studies also showed considerable differences in teachers' performance of the research process itself (e.g. the quality of the carried out practice-based research activities) and perceived outcomes of research between teachers of PDSs. Hence, this study will include perceptions with respect to: (*a*) the realization of the research environment at the school ('contextual input'), (*b*) the motives for performing practice-based research ('personal input'), (*c*) the satisfaction of teachers with the performed research activities ('process'), and (*d*) the (learning) results of these research activities ('outcomes').

Deeper insight into teachers' perceptions of the input (context and personal), process and outcomes of practice-based research in PDS and non-PDS settings can contribute to the further development of PDSs, and suggest directions for schools and teachers regarding the implementation, support and conduct of practice-based research.

4.2 THEORETICAL FRAMEWORK

4.2.1 REALIZING PRACTICE-BASED RESEARCH IN PDSS

In the next section, we will describe the elements of input (contextual and personal) for research, the research process and outcomes of teachers' practice-based research, as schematically displayed in Figure 4.1.

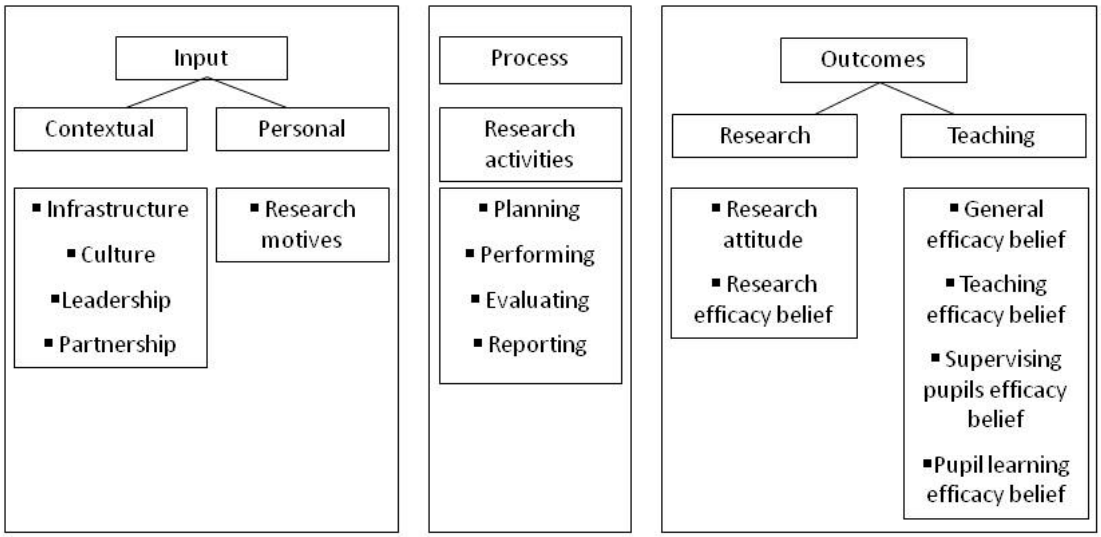


Figure 4.1: *Conceptual scheme*

RESEARCH ENVIRONMENT IN SCHOOLS (CONTEXTUAL INPUT)

A first important element with respect to the environment for practice-based research is the establishment of a supportive school *structure.* Conditions such as a research budget, scheduled hours for the benefit of carrying out the practice-based research project, available physical resources and time for discussing, sharing, and performing practice-based research and its results, and accessible resources as for example free access to books and journals, seem important preconditions for successful practice-based research through teachers in schools (Darling-Hammond, 2005). Another important aspect is the position of practice-based research in school policy (Cochran-Smith & Lytle, 2009). Furthermore, teachers' practice-based research activities are regarded most successful when they are embedded in 'professional learning communities' (Cochran-Smith & Lytle, 1999b; Groundwater-Smith & Dadds, 2006), in which teacher-researchers as well as student teachers can expand their knowledge and skills in a critical dialogue with their colleagues as 'critical friends'.

Second, a successful PDS transforms the traditional culture of schools by fostering a *research culture* conducive to the development of professional learning communities and collaboration (Ebbutt, 2002; Schussler, 2006; Snow-Gerono, 2005). In this respect, teachers in the study of Snow-Gerono identified a shift from traditional isolation to that of a more community-based culture with access to professional peers and experts and the safety of questioning and discussing, as necessary for developing a critical research attitude (e.g. an 'inquiry stance') regarding their own educational practice. Besides this shift to community and collaboration in schools, teachers' professionalism, their willingness to conduct and be actively involved in research, and their recognition of the value of practice-based research, are, according to Ebbutt (2002), import for realizing supportive research cultures in schools. Not only teacher-researchers' engagement in practice-based research is important in this respect, but also the appreciation of colleagues for emerging research initiatives, and the actual use and dissemination of research and research results in the school organization and partnership.

Third, in the establishment of a research culture and environment in schools, the *supportive leadership* of school leaders plays an important role (Krüger, 2010). They need to motivate teachers and stimulate them to investigate questions and search for solutions to problems resulting from their own or shared educational practices. Therefore, not only a school policy supportive for carrying out practice-based research through teachers needs to be in place, but also a policy that links teacher research to school practice in a way that research and research results can actually enable improvement and innovation (Ebbutt, 2002). This also entails establishing clear requirements for and high expectations of teacher-researchers, directed at monitoring research progress and the control of research quality.

Fourth, to create professional space for experienced teachers' embedded professional development and prospective teacher learning through (collaborative) practice-based research, PDSs work together in *partnerships* with other schools and/or teacher education institutes (Conaway & Mitchell, 2004; Cooner & Tochterman, 2004; Cornelissen, van Swet, Beijaard, & Bergen, 2011; Darling-Hammond, 2005; Snow-Gerono, 2005). Within these partnerships collaborations among and across teacher-researchers, their critical colleagues, the participants in the practice-based research projects, academic researchers, teacher educators and so on, can take many forms. Research has shown that it is difficult to realize these PDS partnerships. Different authors name several reasons for this such as (Darling-Hammond, 2005; Doolittle et al., 2008; Rice, 2002; Schepens & Aelterman, 2007): the lack of support in and outside each institution for successful implementation of the collaboration, the inexperience with collaborative decision making, uncertain

environmental constraints and the scarcity of resources or funding for change, and the lack of transparency and formalization of responsibilities, tasks and roles. Furthermore, the establishment and maintenance of the collaborative relationship between partners is difficult because several obstacles have to be overcome, such as cultural differences between partners based on tradition, prior relationships between partners and attitudes of participating individuals with respect to purposes and approaches, the development of trust, parity and reciprocal respect between partners, the identification of partners' individual interests and objectives that can become the basis for common goals and mutual interests, and the creation of effective ways of communicating and respectfully working together (Darling-Hammond, 2005; Doolittle et al., 2008; Gerwitz et al., 2009; Rice, 2002; Schepens & Aelterman, 2007).

It has been argued that because teachers in PDSs find themselves within these unique learning environments, they can more easily conduct (collaborative) practice-based research. However, how the elements of these environments shape teachers' and student teachers' practice-based research activities in PDSs, is less clear (Dana et al., 2011).

TEACHERS' RESEARCH MOTIVATION (PERSONAL INPUT)

In the literature, several expected outcomes for teachers-as-researchers are proposed as goals for teachers' practice-based research projects in schools. By means of carrying out practice-based research, teachers are assumed to deepen their understanding of own (or shared) educational practice including pupil learning and learning results (Cochran-Smith & Lytle, 2009; Ponte, 2005). It is expected that teachers, through conducting practice-based research activities, can acquire deep practical knowledge about the causes and consequences of their actions, find answers to their specific practical problems, and provide evidence about what works in practice and why (Cochran-Smith & Lytle, 2009; Cordingley, 2003; Ponte, 2005). Based upon their developed practical knowledge and the results of their practice-based research projects, teachers can improve, evidence-based, their own or shared educational practice and solve practical problems in their classrooms and/or school organization (Elliott, 2008). These intended results of practice-based research activities, form important *motives* for teachers to conduct practice-based research in their schools. In this study, next to teachers' perceptions of the contextual input (the research environment) teachers' motives for conducting practice-based research will be compared between PDS and non-PDS teachers.

PRACTICE-BASED RESEARCH ACTIVITIES (PROCESS)

In different phases of their practice-based research projects teachers perform various research activities. In the literature, several models for designing teachers' research processes have been described, with approximately the same concepts and elements (Burton & Bartlett, 2005; Hubbard & Power, 1993; 1999; Lankshear & Knobel, 2004; Mills, 2000; Ponte, 2002c). First, activities can relate to the exploration and definition of the research problem(s) and question(s), resulting in a proposed research plan (e.g. '*planning'* the practice-based research). Second, activities can refer to the realization of the proposed research plan, such as collecting and analyzing research data (e.g. *'performing*' the practice-based research). Third, activities can concern the evaluation of the carried out practice-based research (e.g. *'evaluating'* the practice-based research). Fourth and last, activities can be undertaken making the research and research results public (e.g. '*reporting*' the practice-based research). In this study, teachers and student teachers will be asked for their opinion about the quality of the practice-based research activities they have conducted with respect to each of these four elements.

TEACHERS' PROFESSIONAL GROWTH (OUTCOMES)

Practice-based research is assumed to stimulate teachers' knowledge, beliefs and practices, both with respect to teaching and stimulating student learning as well as with respect to conducting research (Ponte et al., 2004). Conditional for doing and using practice-based research through teacher-researchers are their positive attitudes towards research (cf. Kirkpatrick & Kirkpatrick, 2006) and the appreciation of its benefits (cf. Kincheloe, 2003). Both influence the extent to which teachers perceive their role as researchers as meaningful, as well as the extent to which they will learn. This *research attitude* refers to teachers' evaluative quality – liking or disliking practice-based research – (Shrigley, Koballa, & Simpson, 1988), including terms such as interest, enjoyment, and satisfaction (Gardner & Gauld, 1990) and even curiosity, confidence, and perseverance (Shulman & Tamir, 1972).

Prior research has shown that in order for teachers to change or improve their performance and behavior, it is important that teachers believe they can achieve these changes (Bandura, 1997). These efficacy beliefs are thus conditional for achieving the actual outcomes of teachers' practice-based research projects. Research has also shown relevant distinctions between various types of teacher efficacy beliefs such as general teaching efficacy belief and personal teaching efficacy belief (Gibson & Dembo, 1984). This study will focus on teachers' general efficacy beliefs (e.g. their general sense of self-efficacy as an educational

professional), their teaching efficacy beliefs (e.g. their sense of self-efficacy with respect to their teaching in the classroom), their supervising pupils efficacy beliefs (e.g. their sense of self-efficacy with respect to supervising pupils in the classroom), and their pupil learning efficacy beliefs (e.g. their sense of self-efficacy as a teacher influencing pupil learning and learning results).

4.2.2 THE ADDED-VALUE OF PDSS

Experienced teachers and student teachers who carry out in-school practice-based research are expected to become professionals who know how to learn from and about their own or shared educational practice and based upon this learning change their practices. Research has shown that researching teachers both learn about and change their practices with respect to doing practice-based research as well as with respect to their teaching practice (Ponte, 2005). Mule (2006) investigated student teachers' perceptions of their research engagement in PDSs during their yearlong internship. She observed that the students progressively came to perceive themselves as researchers, and, according to her, it is a tag they took great pride in. Students revealed that while the process of engaging in inquiry was challenging at first, it was helpful in several ways (p.209): (a) they became more aware of themselves as teachers and more deliberative in their practice; (b) they experienced a heightened awareness on the need to focus on students and became more innovative in their teaching; and (c) engagement with inquiry offered them an opportunity to reflect deeply on students, teaching, and learning within a web of support provided from various sources (e.g. increased collaboration between mentors and interns). In a study by Levin and Rock (2003), in which experienced teachers collaboratively engaged with student teachers in action research projects in PDSs, experienced teachers revealed, in addition to insights about their roles and responsibilities in pre-service teacher education, some new understandings about their pupils, for example awareness of pupils' needs and motivations, gained knowledge about pupils' progress, abilities and achievement, and their own teaching/instruction as a result of the engagement in research. The student teachers mentioned improved understanding of the self as a teacher, the understanding of their pupils, and the roles and responsibilities of teachers, as learning outcomes. The students also expressed learning in the areas of curriculum content, collaboration, and knowledge of the action research process (p. 140).

Within the Dutch context, Meijer, Meirink, Lockhorst, & Oolbekkink-Marchand (2010) examined the learning results of teachers' practice-based research by means of the validity criteria of Anderson and Herr (1999) in three PDSs. Teachers' research projects delivered mainly results for individual teachers, such as improved knowledge and skills with respect to conducting research, the development of a more critical attitude regarding their own actions and the school organization, and the awareness of and intention to change educational practice. Snoek and Moens (2011) found in their study in the context of three Dutch PDSs that teacher-researchers believed their involvement in conducting research actually led to increased professional development at a range of levels. Learning was, according to the teachers in their study, achieved not only in relation to the specific themes of their research studies, but also with regard to professional detachment, the awareness of the school's overall vision and the school organization, insight into conducting research, the understanding of colleagues, and the increased understanding of their own passions, competencies and potential.

While the discussed studies provide some support for the argued potential of PDSs, the success of PDSs has often not been compared to the regular school setting (Levin & Rock, 2003; Snow-Gerono, 2005; Yendol-Silva & Dana, 2004). Most descriptions of (perceived) outcomes of practice-based research for teachers in PDSs are small-scale, qualitative descriptions of 'success' stories. According to Breault (2010), much of what has been written about PDSs contains accounts of such personal experiences. Furthermore, descriptions of experiences with practice-based research in PDSs were usually restricted to the perceived (learning) outcomes of teachers resulting from their research projects (Clark, 1999; Cooner & Tochterman, 2004). In many of these investigations, other factors influencing the actual research outcomes, for example the culture of the school, supportive conditions, and teacher-researchers motivation for carrying out practice-based research, were not taken into account. Finally, in most of the before mentioned studies, the focus was mainly on the preparation of prospective student teachers and less on the professional development of experienced teachers.

4.2.3 RESEARCH QUESTIONS

In this larger scale study, both teacher-researchers' and student teachers' perceptions of practice-based research are included, and these perceptions are compared between PDSs and non-PDSs. This comparison includes teachers' (1) perceived research environments in schools, (2) their motives for carrying out

practice-based research, (3) their satisfaction with performance of practice-based research activities, and (4) the perceived (learning) outcomes of their practice-based research projects with respect to both the roles of practical researcher as well as teacher. Based upon the above described theoretical framework, the following research questions have been formulated:

1. What are teachers' perceptions of the input, process and outcomes of practice-based research in their schools?

2. Do PDSs make a difference compared with non-PDSs in terms of teachers' perceptions of input, process and outcomes?

4.3 METHOD

4.3.1 RESPONDENTS

To obtain a comprehensive sample for the study school leaders, coordinating 'school educators' and teacher-researchers working in secondary PDSs and managers of teacher education institutes in the Netherlands were contacted. After confirming their participation, schools and teacher education institutes made available contact details of teacher-researchers and researching student teachers in their schools and institutes. The participating teachers received an email with an explanation of the study, and the request to complete an online questionnaire. A total of 102 respondents (teachers and student teachers) from 50 different schools participated in the study.

The schools participating in this study can be divided into two groups: PDSs (N=28) and non-PDSs (N=22). The PDSs were working together in partnerships with other secondary education schools and/or schools of teacher education. In the PDS group, schools of ten different partnerships participated. As far as the non-PDS is concerned, four schools from two partnerships focusing at other topics than practice-based research were included. The remaining non-PDSs were not participating in any partnership. In table 4.1, some details of the participating schools and teachers are shown.

Table 4.1
Details of respondents in the study

Type	Schools	Student teachers	Experienced teachers	Total N teachers
PDSs	28	21	53	74
Non-PDSs	22	18	10	58
Total	50	39	63	102

Of the 102 respondents in the sample, 63 were experienced teachers (involved in practice-based research) and 39 were researching student teachers. The experienced teachers participating in this study had finished (or almost finished) practice-based research as a professional learning activity in their schools. These teachers taught different school subjects for 28,5 hours per week on average (SD = 10.69). Most of the teachers in the sample had between 10 and 30 years teaching experience since graduation. The student-teachers who carried out practice-based research as a part of their teacher training were in their graduation year of their curriculum and were working in one of the participating schools as part of their teacher training. These student-teachers were also teaching different subjects.

4.3.2 THE QUESTIONNAIRE ON TEACHER RESEARCH (QTR)

To map teachers' perceptions the Questionnaire on Teacher Research (QTR) was developed. The instrument is a self-report questionnaire used to assess teachers' perceptions along the main concepts concerning practice-based research in schools (see Figure 4.1). The fifteen elements mentioned in the theoretical framework regarding these main concepts were used to develop items for the QTR (the a-priori scales in this study). Twenty nine items were developed for the contextual input, five items for the personal input, thirty one items for the research process, and thirty eight for the research outcomes. In table 4.2, the a-priori scales and corresponding number of items are presented.

Table 4.2

A-priori and a-posteriori scales, and number of items of the QTR

Domain	A-priori scales (theory driven)	Number of items	A-posteriori scales (empirically found)	Number of items
Input				
	Contextual		*Contextual*	
	Culture	7	Research culture	7
	Infrastructure	7	Research infrastructure	5
	Leadership	10	Partnership	8
	Partnership[1]	5		
	Personal		*Personal*	
	Research motives	5	Research motives	5
Process				
	Planning research	8	Planning and performing research	10
	Performing research	10	Evaluating and reporting research	15
	Evaluating research	6		
	Reporting research	7		
Outcomes				
	Research attitude	5	Research attitude & efficacy beliefs	14
	Research efficacy	7		
	General efficacy	6	Teacher efficacy	15
	Teaching efficacy	8		
	Supervising efficacy	8		
	Pupil learning efficacy	4		
Total N items		103		79

Note[1]: items regarding the partnership were not prescribed for the respondents

Regarding contextual input (e.g. the research environment), four scales were constructed (see table 4.2, first three columns). The *culture scale* measured teachers' perceptions of the school support for practice-based research in their schools. The *structure scale* asked for teachers' perceptions of the existing organizational structure (i.e. conditions such as research budget and available recourses) for performing practice-based research in their schools. The *leadership scale* asked for teachers' perceived support of school leaders related to their practice-based research projects. The formulation of the items of these three contextual scales was inspired by the questionnaire 'Capacity Development in Professional Learning Communities' of Verbiest (2004). Relevant items were selected from this original instrument, and items were adapted to apply to the context of practice-based research in schools. The *partnership scale* measured teachers' perceptions of the collaboration of their schools with other partners with

respect to practice-based research. Items of this scale were based upon the principles and features Schepens and Aelterman (2007) distinguished for effective learning in partnerships. These principles and features formed the starting point for the formulation of items for this scale. Teachers had to indicate the extent to which they agreed with each item on a 5-point Likert-type answering scale ranging from 0 (not or in a very small extent) to 5 (in a very high extent).

The items developed for the personal input (the *research motives scale*) measured teachers' motives for performing practice-based research. The five items for this scale were based upon the goals for teachers' practice-based research as formulated by the Dutch government (Ministry of Education, Culture, & Science, 2010). These motives include gathering insight and improving own acting. Responses had to be given on a 5-point Likert-type answering scale ranging from 0 (not or in a very small extent) to 5 (in a very high extent).

The research process contained scales representing the four phases of teachers' practice-based research: planning, performing, evaluating and reporting (see table 4.2, first three columns). The *planning scale* asked for teachers' perceived performance regarding the planning of their practice-based research projects. The *performing scale* measured teachers' perceptions of the execution of the planned research project. The *evaluating scale* asked for teachers' perceived assessment of their research projects. Finally, the *reporting scale* measured teachers' perceptions of reporting and presenting the research results of their practice-based research projects. The items for these process scales were based upon a literature review on models for designing the practice-based research process and research activities (Burton & Bartlett, 2005; Hubbard & Power, 1993; 1999; Lankshear & Knobel, 2004; Mills, 2000; Ponte, 2002c). Based upon these models, a list of possible research activities was made. Thereupon, items were formulated with respect to these research activities. All items for the four process scales were rated in terms of respondents' satisfaction using a 4-point scale with the categories ranging from (1) not performed at all, (2) weakly performed, (3) well performed to (4) very well performed.

Fourth, research outcomes encompassed six scales measuring outcomes of teachers' practice-based research projects regarding the researcher and teacher roles (see table 4.2, first two columns). Regarding the researcher role, a first scale measured teachers' attitudes towards research (encompassing relevance, interest, curiosity, and pleasure with respect to practice-based research) and was inspired by attitudinal elements such as measured with the 'Test of science related attitudes' (Fraser, 1981). For the present study, attitudinal items were adapted to

measure teachers' attitudes with respect to conducting and using practice-based research. The second scale measured teachers' research efficacy beliefs, e.g. the belief they felt competent in conducting practice-based research. Regarding the teacher role four scales were developed, measuring teachers' self-efficacy beliefs: their general efficacy belief, their teaching efficacy belief, their supervising pupils efficacy belief, and their pupil learning efficacy belief. The efficacy scales were based upon several efficacy questionnaires such as the 'Teacher efficacy scale' (Gibson & Dembo, 1984), the 'Science teaching efficacy belief instrument' (Riggs & Enochs, 1990), and the 'Teacher self-efficacy scale' (Bandura, 1990). Relevant items from the different questionnaires were adapted and reformulated to fit the context of practice-based research. Responses regarding these outcome items had to be given on a 5-point Likert-type answering scale indicating change ranging from (1) much smaller/more badly to (5) much more/much better. The questionnaire had to be completed online.

Initial analyses to establish the quality of the questionnaire indicated high reliabilities for all a-priori scales (between .74 and .92). However, the analyses also indicated (extremely) high correlations between some of the a-priori scales (mainly between the six a-priori outcome scales). Therefore, an exploratory factor analysis with varimax rotation (using SPSS) was conducted to investigate the structure of items within the distinguished main concepts. In table 4.2, the eight categories (the a-posteriori scales in this study) resulting from the factor analyses and their corresponding number of items are displayed (last two columns). The a-posteriori scales that emerged were mostly combinations of the a-priori scales (with approximately the same contents). The part measuring contextual input resulted in three scales (with an Eigenvalue larger than 1). Based on an interpretation of the factor loadings, the factors could be labeled 'research culture', 'research infrastructure' and 'partnership'. The three scales explained 55,5 % of the variance. Because the research motives scale was sufficiently reliable and only moderately correlated with other scales, it was decided to keep this scale as originally conceived. The factor analysis for the research process part resulted in two scales (with an Eigenvalue larger than 1): 'planning and performing practice-based research', and 'evaluating and reporting practice-based research'. The two scales explained 39,2% of the variance. Last, research outcomes could be distinguished in two scales (with an Eigenvalue larger than 1). Based upon the interpretation of the factor loadings, the factors could be labeled 'research attitude and efficacy beliefs' and 'teacher efficacy'. These two scales explained 59,4% of the variance.

Table 4.3

Domains, scales, Cronbach's alpha (CA), and sample items for the QTR scales

Domain	Scale	CA	Sample item
Input			
	Contextual		
	Research culture[1]	0.81	'At our school, teachers' practice-based research is taken for granted'
	Research infrastructure[1]	0.71	'At our school, the school leader showed interest in my practice-based research'
	Partnership[1]	0.90	'Our school makes a contribution to the research partnership'
	Personal		
	Research motives[1]	0.74	'I conduct practice-based research because I want to gather more insight into pupils' (learning) needs'
Process			
	Planning and performing research[2]	0.84	'During the planning phase of my practice-based research, I have made a research plan'
	Evaluating and reporting research[2]	0.92	'During the evaluation phase of my practice-based research, I have discussed the conclusions of my research with colleagues'
Outcomes			
	Research attitude and efficacy beliefs[3]	0.93	'Resulting from my practice-based research, I now enjoy conducting practice-based research'
	Teacher efficacy[3]	0.95	'Resulting from my practice-based research, I am now directed at improving pupils' education'

Note[1]: 5-point Likert-scale (1 = not or in a very small extent, 5 = in a very high extent)
Note[2]: 4-point scale (1 = not performed at all, 2 = weak performed, 3 = medium performed, 4 = very well performed
Note[3]: 5-point Likert-scale (1 = much smaller/ more badly, 5 = much more/ much better)

In table 4.3, the eight a-posteriori scales resulting from the factor analyses are displayed as well as some example items. Reliability of each a-posteriori scale was investigated by calculating internal consistency (e.g. Cronbach's alpha). The alpha's of the eight scales varied from 0.71 to 0.95. The results showed all scales to be reliable (above 0.70). Nine items for the contextual input, six items for the research process, and nine items for research outcomes could - based on the factor analyses - not be assigned to a scale that was reliable and internally consistent, and were therefore deleted.

To investigate construct validity, scale inter-correlations were computed. In Table 4.4, correlations between the eight different scales of the QTR are presented. Pearson correlation coefficients ranged between .21 and .68. Strong correlations existed between the contextual input scales: between research culture and research infrastructure (.48); research culture and partnership (.54); and research infrastructure and partnership (.59). Also, between research infrastructure and evaluating and reporting practice-based research there was a considerable correlation (.54). Research motives correlated highly with the outcome scales (.56 and .53, respectively). Last, there was a strong correlation between the two outcome scales (.68). However, the correlations were nowhere higher than .70 (e.g. De Jong & Westerhof, 2001). It can thus be concluded that the a-posteriori scales could be used separately in subsequent analyses.

Table 4.4

Pearson correlations between QTR scales

Scales		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	Research culture	-							
(2)	Research infrastructure	.48**	-						
(3)	Partnership	.54**	.59**	-					
(4)	Research motives	.20	.21*	.12	-				
(5)	Planning and performing research	.11	.13	.18	.17	-			
(6)	Evaluating and reporting research	.17	.54**	.37**	.14	.35**	-		
(7)	Teacher efficacy	.22*	.13	.12	.56**	.31**	.11	-	
(8)	Research attitude and efficacy beliefs	.28**	.38**	.37**	.53**	.33**	.39**	.68**	-

*Note: ** p < .01, * p < .05*

4.3.3 DATA ANALYSIS

To answer the first research question, a descriptive analysis was done to determine teachers' average perception scores and standard deviations for the QTR scales. To answer the second research question, first a means analysis (one-way ANOVA) was conducted to compare the mean perception scores of the teachers on the scales between PDSs and non-PDSs. Differences were tested with an F-value, the proportion of explained variance (eta squared) and effect sizes were determined. These analyses provided a 'raw' difference, since possible affecting covariates were

not taken into account. Therefore, a two-way ANOVA was conducted in which the difference between PDS and non-PDS was corrected for teacher experience (as covariate). Teacher experience was divided into two categories for this purpose, namely student teacher (no experience) and practicing teacher (one or more years of teaching experience). Again, differences were tested with an F-value, and the proportion of explained variance and effect sizes were determined.

4.4 RESULTS

4.4.1 TEACHERS' PERCEPTIONS OF PRACTICE-BASED RESEARCH (RQ1)

The overall means and standard deviations for the QTR scales are presented in table 4.5 (columns 3 and 4). The results show that for all QTR scales, except for the evaluating and reporting scale, respondents on average scored above the scale medium. Respondents scored on average highest with respect to the research motives scale. Also, regarding both outcome scales, respondents on average scored rather high. The respondents were somewhat positive with respect to the three contextual input scales and the planning and performing research scale. With respect to the evaluating and reporting research scale, respondents scored medium/neutral to just below the scale medium. On average, the variance in respondents' scores was moderate. The partnership scale had the largest variance of all eight scales, suggesting that, overall, respondents varied most on this scale in their responses. Also, the research infrastructure scale had a large variance. For the planning and performing research scale, the smallest variance was found.

4.4.2 PDS AND NON-PDS TEACHERS' PERCEPTIONS (RQ2)

Mean scores on the eight scales for teachers from PDSs and non-PDSs, the corresponding F-values, p-values and proportion of explained variance (eta squared) by the comparison, are depicted in table 4.5 (see columns 5 to 9).

Table 4.5

Respondents' average scores on QTR scales and ANOVA results for PDSs versus non-PDSs

Domain	Scale	Overal mean (sd)	Mean PDSs	Mean Non-PDSs	F	Sig.	Eta[2]
Input							
	Contextual						
	Research culture	3.10 (.68)	3.20	2.86	5.17	.025*	.050
	Research infrastructure	3.04 (.86)	3.30	2.39	28.89	<.001**	.226
	Partnership[1]	2.93 (.96)	3.17	2.13	18.89	<.001**	.203
	Personal						
	Research motives	3.88 (.70)	3.96	3.67	3.36	.070	.034
Process							
	Planning and performing research[2]	2.98 (.57)	3.05	2.79	3.78	.055	.039
	Evaluating and reporting research[2]	2.38 (.73)	2.48	2.08	5.52	.021*	.058
Outcomes							
	Research attitudes and efficacy beliefs	3.43 (.68)	3.54	3.10	7.95	.006**	.084
	Teacher efficacy	3.54 (.64)	3.58	3.41	1.25	.268	.014

Note[1]: Items for the partnership scale were not compulsory for the respondents to answer

Note[2]: The results for the scales 'planning and performing research' and 'evaluating and reporting research' were recalculated (from a 4 to a 5-point scale)

*Note: ** p < .01, * p < .05*

Across all scales there is a clear trend visible in the results: respondents' perception scores in PDSs are higher for all scales compared to those in non-PDSs, but these differences were not always statistically significant. There was a strong statistically significant difference for research infrastructure (F (1, 99) = 28.89, p < .001). This difference was strong with an effect size of 1.18. The difference between PDS and non-PDS explained 23% of the variance in research infrastructure. There was also a strong statistically significant difference for partnership (F (1, 74) = 18.89, p < .001), with an effect size of 1.24. The difference between PDS and non-PDS explained 20% of the variance in partnership.

Last, there was a strong statistically significant difference on the scale research attitude and efficacy beliefs (F (1, 87) = 7,95, p = .006); the effect size was 0.72. The difference between PDS and non-PDS explained 8% of the variance in research attitude and efficacy beliefs. In all of these cases, respondents in PDSs had higher perception scores than respondents in non-PDSs. There were also two smaller statistically significant differences between teachers from PDSs and non-PDSs. There was a difference for research culture (F (1, 99) = 5.17, p = .025). This difference had an effect size of 0.52. The difference between PDS and non-PDS explained 5% of the variance in research culture. Another difference regarded the evaluating and reporting research scale (F (1, 89) = 5.52, p = .021). This difference had an effect size of 0.45, and explained 6% of the variance in this scale.

In table 4.6, the results of the ANOVA for differences in perceptions between teachers of PDSs and non-PDSs with experience (student teacher or not) as covariate are presented for the eight QTR scales. As can be seen in table 4.6, the statistically significant differences between PDS and non-PDS respondents found in the former analysis, remained after taking the distinction between teacher-researchers and student-teachers into account. Strong effects remained for research infrastructure (F (1, 97) = 19.63, p < .001), for partnership (F (1,72) = 10.19, p = .002), and research attitude and efficacy beliefs (F (1,85) = 4.14, p = .045). However, the effect size of the last scale decreased from 0.72 to 0.54. The difference for research culture remained equally large (F (1,97) = 5.80, p = .018), with an effect size of 0.58.

A new, statistically significant difference for planning and performing research emerged (F (1,90) = 5.20, p .025), with a small to medium effect size (0.47). With respect to evaluating and reporting research, the initial statistically significant difference became non-significant after taking into account experience (F (1,87) = 2.31, p =.13). Interaction between PDS versus non-PDS and experience (teacher-researcher and student-teacher) were nowhere found to be statistically significant.

Table 4.6

ANOVA results distinguished for PDSs versus non-PDSs and experience[1]

Dependent variable	Source	F	Sig.[4]
Research culture	Professional Development School or not	5.80	.018*
	Experience	.39	.535
Research infrastructure	Professional Development School or not	19.63	< .001**
	Experience	3.91	.051
Partnership[2]	Professional Development School or not	10.19	.002**
	Experience	1.66	.202
Research motives	Professional Development School or not	1.05	.308
	Experience	3.64	.059
Planning and performing research[3]	Professional Development School or not	5.20	.025*
	Experience	1.33	.253
Evaluating and reporting research[3]	Professional Development School or not	2.31	.132
	Experience	4.22	.043*
Research attitude and efficacy beliefs	Professional Development School or not	4.14	.045*
	Experience	3.17	.079
Teacher efficacy	Professional Development School or not	.83	.366
	Experience	.33	.570

Note[1]: Experienced teachers versus student teachers
Note[2]: Items for the partnership scale were not compulsory for the respondents to answer
Note[3]: The results for the scales 'planning and performing research' and 'evaluating and reporting research' were recalculated (to a 5-point scale)
*Note[4]: ** p < .01, * p < .05*

4.5 CONCLUSION AND DISCUSSION

In this study, the Questionnaire on Teacher Research (QTR) was developed to analyze experienced teachers' and student teachers' perceptions of practice-based research in their secondary education schools. The respondents were asked for their perceptions of practice-based research in terms of input (contextual and personal), process and outcomes. In the study, differences in perceptions between teachers of PDSs and non-PDSs were investigated. Based upon the results we can draw two important conclusions.

First, respondents scored on average highest with respect to their research motives and the outcomes of practice-based research. The average scores for the three contextual input scales were lower, and scores for the two process scales the lowest. Second, the results showed PDS teachers scoring higher for all eight QTR-scales compared to non-PDS teachers. Differences between PDSs and non-PDSs were large for partnership, research infrastructure and for teachers' research attitudes and efficacy beliefs. Thus, teachers from PDSs perceived more influence of partnerships, noticed a larger availability of means and opportunities to conduct research and felt they had more expertise in conducting research than teachers from non-PDSs. Furthermore, the results also showed statistically significant differences between PDSs and non-PDSs for research culture and for evaluating and reporting research. After taking into account teachers' experience, differences remained. Only, the difference for teachers' research attitudes and efficacy beliefs became less strong and a new, statistically significant difference for planning and executing research emerged. So, the experience of the respondents hardly affected differences between PDSs and non-PDSs. Based on these results it can be concluded that in terms of teachers' perceptions PDSs do matter and that teachers perceive such schools as more positive environments for research.

The differences found between PDSs and non-PDSs can be interpreted mainly as first order changes. These are changes in practices (Fullan, 2007) without underlying changes in beliefs. As can be seen, differences mainly occurred in the contextual elements and research outcomes. So-called second-order changes, encompassing teachers' fundamental beliefs about current educational practice, leading to new goals, motives, or roles, were limitedly visible when looking at differences between PDSs and non-PDSs. The fact that first-order changes were found in this study aligns with findings of prior studies showing that teachers in the earlier years of an educational innovation mainly focus on structuring the innovation and not so much on the meaning of this innovation for their own professional learning (see chapter 2).

Obviously, the results from this study lead to some implications. First, the analyses showed the Questionnaire on Teacher Research to be a useful, reliable and valid tool for assessing teachers' perceptions of their research efforts. Second, the results suggested aspects of teachers' practice-based research in secondary education schools that have room for improvement: the scales where no significant differences were visible between PDSs and non-PDSs (e.g. research motives, teacher efficacy) and the scales with the smallest scale scores (e.g. the two process scales and the partnership scale). Thus, more effort should be put in establishing partnerships by schools, while at the same time teachers' research motives should

be stimulated. Also, there seems to be a need to better clarify to teachers the benefits that research can have for their teaching. Third, the results of this study support the claim that PDSs as research environments have added value, at least as far as the perceptions of experienced teachers and student teachers are concerned.

4.5.1 DIRECTIONS FOR FUTURE RESEARCH

The present study had certain limitations which provide directions for future research. First, because of the online data collection, nothing can be said about the initial response rate. Besides this, only limited information is available regarding the composition of the non-PDS group. For these non-PDSs practice-based research is not the focus of their educational policy, but less explicit in our data is how these schools support the practice-based research projects of, most times, student teachers who need to perform research as part of the teacher training curriculum.

Furthermore, Pearson correlation coefficients showed some overlap between the two outcome scales (e.g. between research attitudes and efficacy beliefs, and teacher efficacy). Perhaps, at this stage teachers cannot make the distinction between those two outcomes when it comes to the effects of teacher research, possibly because of the recent introduction of practice-based research as an educational innovation. Future research with the questionnaire can confirm if this is indeed the case.

Last, by means of the QTR experienced teachers' and student teachers' perceptions of practice-based research in secondary education schools were mapped. In future research it would be interesting to use other data collection methods, such as observations as well or other research strategies such as measuring pupil learning outcomes to investigate the implementation and results of teachers' practice-based research.

CHAPTER

5

TEACHERS' PERCEPTIONS OF PRACTICE-BASED RESEARCH: TESTING A MODEL THAT DESCRIBES RELATIONS BETWEEN INPUT, PROCESS AND OUTCOME VARIABLES[7]

ABSTRACT

In-school practice-based research by teachers has been suggested as a powerful activity to foster meaningful professional learning. In this study, structural equation modeling was used to investigate paths (relations) between respondents' perceptions of context variables (research structure, research culture, and partnership), motives for performing practice-based research, process variables (planning and performing research, and evaluating and reporting research), and outcome variables (research attitude and efficacy beliefs, and teacher efficacy beliefs). In the study, 56 teacher-researchers and student teachers who carried out practice-based research in secondary education schools in the Netherlands were asked for their perceptions by means of a questionnaire. The results suggested different structural paths to explain associations between the different variables. The model showed that outcomes of practice-based research were mainly influenced by research process variables and motives to conduct research. This implies that schools implementing practice-based research as a professional learning activity should focus on the process of practice-based research and teachers' motives for performing practice-based research.

[7] This chapter has been submitted in adapted form as:
Vrijnsen – de Corte, M., den Brok, P., Kamp, M., & Bergen, T. *Teachers' perceptions of practice-based research: Testing a model that describes relations between input, process and outcome variables*.

5.1 INTRODUCTION

In-school practice-based research is commonly seen by researchers, teacher educators and policy makers as an important activity for the professional development of both experienced and prospective teachers (Cochran-Smith & Lytle, 2009; Zeichner & Noffke, 2001). It is expected that teachers who investigate practical problems and examine questions resulting from their own daily practice actively construct knowledge about or gain insight into their own or shared educational practice (Cochran-Smith & Lytle, 1999a; Fenstermacher, 1994). It is assumed that via practice-based research teachers can more effectively improve their educational practice, which ultimately will lead to improvement of pupil learning as well as school development (Teitel, 2003). Both student teachers and experienced teachers have to acquire the teacher-researcher role, which differs from their regular teaching role. Recently, secondary education schools, in particular professional development schools (PDSs), have established research environments supportive and stimulative for practice-based research through teachers and student teachers in their schools (NCATE, 2001; Teitel, 2003). PDSs or research oriented schools have been established in several countries, such as Canada, Australia, England, and the USA (Harris & van Tassel, 2005), but also in the Netherlands (Meijer et al., 2010; Snoek & Moens, 2011).

In many studies, investigating teacher research in PDSs (for example Snow-Gerono, 2005) as well as studies on teacher action research (for example Ponte, 2002b) or practice-based research (for example Cochran-Smith & Lytle, 2009), the influence of performing practice-based research leading to certain research outcomes within a context containing stimulating or hindering factors is *assumed*, but the actual relationship between such variables is most times not empirical explored. In several studies, research outcomes are reported, but the manner in which they can be explained by other influencing variables such as the research context in schools or the practice-based research process itself is not investigated.

In the present study, relations between teachers' perceptions regarding practice-based research were investigated. These perceptions were measured by means of a questionnaire, developed via two earlier studies conducted by the authors (see chapter 2 and 3).

This study will focus on (student) teachers' perceptions with respect to: (*a*) the realization of the research environment at the school ('contextual input'), (*b*) the motives for performing practice-based research ('personal input'), (*c*) the satisfaction of teachers with performed research activities ('process'), and (*d*) the

(learning) outcomes that result from these research activities ('outcomes'). By means of analyzing questionnaire data and testing a hypothetical (structural equation) model, we will gather (1) empirical support for assumed relations between concepts associated with practice-based research, and (2) insight into the relative importance of these different concepts in explaining research outcomes. Deeper insight into the relations between (teachers' perceptions of) the input, process and outcomes of practice-based research and the relative strength of these relations, can suggest directions for the successful realization of practice-based research as a professional learning activity in schools.

5.2 THEORETICAL FRAMEWORK

5.2.1 ASPECTS OF PRACTICE-BASED RESEARCH IN PDSS

Prior studies on practitioner research in schools suggest different variables that play an important role in the realization of (student) teachers' practice-based research in secondary education schools. In the next section, we will describe these input (contextual and personal), process and outcome related variables and their interconnectedness, more deeply.

CONTEXTUAL INPUT (RESEARCH ENVIRONMENT IN SCHOOLS)

A first important element with respect to the environment for practice-based research is the establishment of a supportive *research structure* in schools. Conditions such as a research budget, scheduled hours for the benefit of carrying out the practice-based research project, available physical resources and time for discussing, sharing, and performing practice-based research and its results, and accessible resources such as books and journals, seem important preconditions for successful, practice-based research through teachers in schools (Darling-Hammond, 2005). Another important aspect is the position of practice-based research in school policy (Cochran-Smith & Lytle, 2009) for example the integration with existing educational innovations in the school organization or with the training of student teachers. Furthermore, teachers' practice-based research activities are regarded most successful when they are embedded in 'professional learning communities' (Cochran-Smith & Lytle, 1999b; Groundwater-Smith & Dadds, 2006), in which teacher-researchers as well as student teachers can expand their knowledge and skills in a critical dialogue with their colleagues as 'critical friends'.

Second, a *research culture* conducive to the development of professional learning communities and collaboration is an important element with respect to the performance of practice-based research (Ebbutt, 2002; Schussler, 2006; Snow-Gerono, 2005). Besides a shift from traditional isolation to community and collaboration in schools, teachers' professionalism or their willingness to conduct and be actively involved in research, and teachers' recognition of the value of practice-based research, are, according to Ebbutt (2002), important for realizing supportive research cultures in schools. Not only teacher-researchers' engagement in practice-based research is important in this respect, but also the appreciation of colleagues for emerging research initiatives, and the actual use and dissemination of research and research results in the school organization and partnership.

Third, in the establishment of a productive research environment in schools, the *supportive leadership* of the school leader plays an important role (Krüger, 2010). Principals need to motivate teachers and stimulate them to investigate questions and search for solutions to problems resulting from their own or shared educational practices. Therefore, not only a school policy supportive for carrying out practice-based research through teachers needs to be in place, but also a policy that links teacher research to school practice in a way that research and research results can actually enable improvement and innovation (Ebbutt, 2002). This also entails establishing clear requirements for and high expectations of teacher-researchers, directed at monitoring research progress and the control of research quality. Prior research by the authors has shown that teachers hardly seem to distinguish between on the one hand 'research culture' or supportive leadership with respect to the realization of a research supportive culture and on the other hand 'research infrastructure' or supportive leadership with respect to the realization of conditions supportive and/or stimulative for practice-based research (see chapter 4).

Fourth, to create professional space for experienced teachers' embedded professional development and prospective teacher learning through (collaborative) practice-based research, professional development schools work together in *partnerships* with other schools and/or teacher education institutes (Conaway & Mitchell, 2004; Cornelissen et al., 2011; Cooner & Tochterman, 2004; Darling-Hammond, 2005; Snow-Gerono, 2005). Within these partnerships collaborations among and across teacher-researchers, their critical colleagues, the participants in the practice-based research projects, academic researchers, teacher educators and so on, can take many forms.

In different studies investigating (student) teachers' practice-based research in schools, teachers and student teachers have mentioned the presence of a research culture (Worrall, 2004) and research infrastructure (Worrall, 2004; Watkins, 2006) and the way in which these are realized in schools, as important preconditions for performing practice-based research. Most times, different contextual aspects together (research culture, research infrastructure and supportive leadership) were mentioned as prerequisite; partnership emerged as a concept unique for the PDS in these studies. However, while several studies have investigated (student) teachers' perceptions of practice-based research within the PDSs context (Mule, 2006; Levin & Rock, 2003), the influence of factors such as the partnership on the actual research process and outcomes following (student) teachers' practice-based research activities, has less frequently been investigated. In this study, the three contextual input variables included are: 'research culture', 'research infrastructure' (both including some aspects of supportive leadership), and 'partnership'.

PERSONAL INPUT (TEACHERS' RESEARCH MOTIVATION)

In the literature, several goals or expected outcomes are proposed for teachers' practice-based research. By means of carrying out practice-based research, teachers are assumed to deepen their understanding of own (or shared) educational practice, including pupil learning and learning results (Cochran-Smith & Lytle, 2009; Ponte, 2005). It is expected that teachers, through conducting practice-based research activities, can acquire deep practical knowledge about the causes and consequences of their actions, find answers to their specific practical problems, and provide evidence about what works in practice and why (Cochran-Smith & Lytle, 2009; Cordingley, 2003; Ponte, 2005). Based upon their developed practical knowledge and the results of their practice-based research projects, teachers can improve, evidence-based, their own or shared educational practice and solve practical problems in their classrooms and/or school organization (Elliott, 2008). These intended results of practice-based research activities, form important *motives* for teachers to conduct practice-based research in their schools (see for example Worrall, 2004 and Watkins, 2006). Worrall (2004) states the concept of personal development features in most teachers' accounts of the reasons behind their involvement in research. However, the relations between certain motives for performing practice-based research and the actual performance of the research process or the gathered research outcomes have not been investigated. Therefore, teachers' 'research motives' are included in this study as an important personal input variable.

PRACTICE-BASED RESEARCH PROCESS (RESEARCH ACTIVITIES)

In different phases of their practice-based research projects teachers perform various research activities. In the literature, several models for teachers' research processes have been described, with approximately the same concepts and elements (Burton & Bartlett, 2005; Hubbard & Power, 1993; 1999; Lankshear & Knobel, 2004; Mills, 2000; Ponte, 2002c). First, activities can relate to the exploration and definition of the research problem(s) and question(s), resulting in a proposed research plan or, in other words, the 'planning' of the practice-based research. Second, activities can refer to the realization of the proposed research plan, such as collecting and analyzing research data or, in other words, 'performing' the practice-based research. Third, activities can concern the evaluation of the carried out practice-based research or, in other words, 'evaluating' the practice-based research. Fourth and last, activities can be undertaken making the research and research results public or, in other words, 'reporting' the practice-based research. Within a research cycle, the different research activities are supposed to follow up each other (Ponte 2002c). Prior research conducted by the authors showed that teachers mainly make a distinction between planning and performing practice-based research and the 'more finalizing' activities such as evaluating and reporting (see chapter 4). In most studies on (student) teachers' practice-based research, perceived (learning) outcomes have been investigated, both with respect to performing research as well as with respect to teaching (Levin & Rock, 2003; Henson, 2001; Zeichner & Noffke, 2001), but most times not in relation to the actual research process itself (and the performed research activities). Therefore, in this study two process variables are included: 'planning and performing research' and 'evaluating and reporting research'.

(LEARNING) OUTCOMES (TEACHERS' PROFESSIONAL GROWTH)

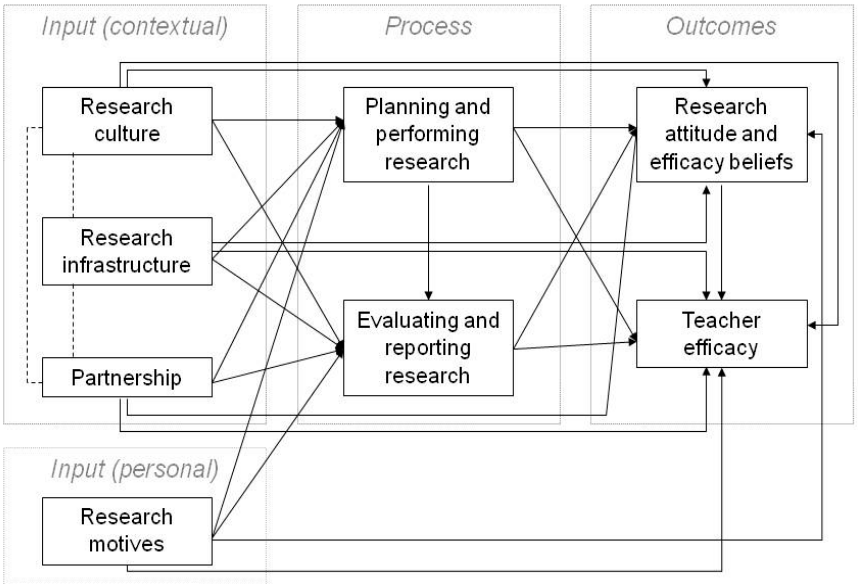
Practice-based research is assumed to stimulate teachers' knowledge, beliefs and practices, both with respect to teaching and student learning as well as with respect to conducting research (Ponte et al., 2004). Conditional for doing and using practice-based research through teacher-researchers are their positive attitudes towards research (cf. Kirkpatrick & Kirkpatrick, 2006) and their appreciation of its benefits (cf. Kincheloe, 2003). Both influence the extent to which teachers perceive their role as researchers as meaningful as well as the extent to which they will learn. This *research attitude* refers to teachers' evaluative quality – like or dislike of practice-based research – (Shrigley et al., 1988), including terms such as interest, enjoyment, and satisfaction (Gardner & Gauld, 1990) and even curiosity, confidence, and perseverance (Shulman & Tamir, 1972). It is assumed that these

attitudes in turn determine teachers' efficacy beliefs with respect to performing practice-based research activities.

Research has shown that in order for teachers to change or improve their behavior related to their teaching practice, it is important that teachers believe they can achieve these changes (Bandura, 1997). Research efficacy beliefs are thus conditional for performing research as well as for achieving the actual outcomes of teachers' practice-based research projects. Research has also shown relevant distinctions between various types of efficacy beliefs, such as general teaching efficacy belief and personal efficacy belief (Gibson & Dembo, 1984). In our prior research it was found that in teachers' perceptions only a meaningful distinction could be made between research-related outcomes or, in other words, 'research attitude and efficacy beliefs' and teaching-related outcomes or, in other words, 'teacher efficacy' (see chapter 4). In this study we therefore included these two outcome variables.

RELATIONS BETWEEN INPUT, PROCESS AND OUTCOMES

In conclusion, it can be stated that many assumptions regarding relations or influences between aspects associated with (student) teachers' practice-based research in schools, have not (yet) been supported with empirical evidence. If aspects and their interrelations were investigated, this most times happened between specific pairs or parts of the variables discussed; a complete test of relations between the context, process and outcome variables has – at least to our knowledge – not yet been conducted. This study is directed at this more encompassing test of associations between variables as perceived by teachers and student teachers. The assumed relations as described in the theoretical framework and the starting points of our research are presented in the hypothetical starting model visualized in Figure 5.1.



Note: → assumed direct relations, --- assumed associations between variables rather than causal relations

Figure 5.1: *Hypothetical starting model*

5.2.3 RESEARCH QUESTION

The main question investigated in this study is: What model explains the empirical relations that exist in (student) teachers' perceptions of factors associated with the input (contextual and personal), process and outcomes of in-school practice-based research? This resulted in the following more specific sub questions:

1. What relations exist between (student) teachers' perceptions of input (context and personal), process and outcome variables?

2. What empirical model explains these relations (e.g. fits the data)?

a. What direct and indirect relations exist in this empirical model between (student) teachers' perceptions of the input, process and outcomes of practice-based research?

b. What relative importance do different input and process variables have on outcomes of practice-based research?

5.3 METHOD

5.3.1 RESPONDENTS

For the benefit of analyzing relations between variables associated with practice-based research in schools by means of structural equation modeling (SEM), data was selected from a larger data set on (student) teachers' perceptions (see chapter 4). Only respondents who answered items for all variables in the questionnaire – so, including the partnership variable that is only present in PDSs or teacher education practice schools – are included in the analysis. Data of a total of 56 respondents were included in the study: 39 were experienced teachers and 17 were student teachers. The experienced teachers participating in this study had finished (or almost finished) practice-based research as a professional learning activity in their schools. These teachers taught different school subjects and worked 27,6 hours per week on average (SD = 10,3). Most of the teachers in the sample had between 20 and 30 years teaching experience since graduation. The student-teachers who carried out practice-based research as a part of their teacher training were in their graduation year of their curriculum and were working in one of the participating schools as part of their teacher training. These student teachers were also teaching different subjects.

5.3.2 INSTRUMENTATION

Based upon the findings of two prior studies, the Questionnaire on Teacher Research (QTR) was developed in order to map (student) teachers' perceptions (see chapter 4 for a more detailed description of the construction process of this questionnaire). The instrument is a self-report questionnaire used to assess teachers' perceptions concerning practice-based research in schools. The questionnaire consisted of eight scales with a total of 79 statements to be rated. In table 5.1, the eight scales, their corresponding number of items, the Cronbach's alpha's (CA) as well as some example items, are displayed.

Table 5.1

Domains, scales, number of items, Cronbach's alpha (CA), and sample items for the QTR scales

Domain	Scale	Items	CA	Sample item
Input				
	Contextual			
	Research culture[1]	7	0.81	'At our school, teachers' practice-based research is taken for granted'
	Research infrastructure[1]	5	0.71	'At our school, the school leader showed interest in my practice-based research'
	Partnership[1]	8	0.90	'Our school makes a contribution to the research partnership'
	Personal			
	Research motives[1]	5	0.74	'I conduct practice-based research because I want to gather more insight into pupils' (learning) needs'
Process				
	Planning and performing research[2]	10	0.84	'During the planning phase of my practice-based research, I have made a research plan'
	Evaluating and reporting research[2]	15	0.92	'During the evaluation phase of my practice-based research, I have discussed the conclusions of my research with colleagues'
Outcomes				
	Research attitude and efficacy beliefs[3]	14	0.93	'Resulting from my practice-based research, I now enjoy conducting practice-based research'
	Teacher efficacy[3]	15	0.95	'Resulting from my practice-based research, I am now directed at improving pupils' education'

Note[1]: 5-point Likert-scale (1 = not or in a very small extent, 5 = in a very high extent)
Note[2]: 4-point scale (1 = not performed at all, 2 = weak performed, 3 = medium performed, 4 = very well performed
Note[3]: 5-point Likert-scale (1 = much smaller/ more badly, 5 = much more/ much better)

Regarding the contextual input, the 'research culture' scale measured teachers' perceptions of the school support by colleagues and school leaders for practice-based research in their schools. The 'research infrastructure' scale asked for teachers' perceptions of the existing organizational structure, including conditions such as research budget, available resources, and supportive school policy for performing practice-based research in their schools. The 'partnership' scale measured teachers' perceptions of the collaboration of their schools with other partners with respect to practice-based research. The research motives scale (personal input) measured teachers' motives for performing practice-based research. The first process scale, 'planning and performing research', asked for teachers' perceptions of the activities with regard to planning and performing practice-based research. The second process scale, 'evaluating and reporting research', measured teachers' perceptions of the activities with respect to the evaluation and report of the practice-based research. The first outcome scale, 'research attitude and efficacy beliefs', mapped teachers' perceptions of the outcomes of their practice-based research with respect to performing research: changed research attitude, and improved/reduced research knowledge and skills. Last, the second outcome scale, 'teacher efficacy', measured teachers' perceptions of the outcomes of their practice-based research with respect to teaching (their self-efficacy beliefs). The Cronbach's alpha's (CA) of the eight scales varied from 0.71 to 0.95. The results showed all scales to be reliable (above 0.70). The questionnaire had to be completed by (student) teachers online.

5.3.3 DATA ANALYSIS

In order to gain insight into the presence of the eight variables in the present sample, a descriptive analysis was conducted. Average scale scores and standard deviations were calculated using SPSS. In addition, Pearson correlations between the QTR-scales were calculated. In order to further investigate the relations between the perceived aspects of teachers' practice-based research in secondary education schools (e.g. the QTR scales), a structural model using MPlus (Muthén & Muthén, 1999) was tested. The data of the aforementioned 56 respondents were used for the modeling process. In the hypothetical starting model (see Figure 5.1), relations were assumed between the contextual variables research culture, research infrastructure and partnership. These contextual variables, teachers' research motives and the two process variables (planning and performing research, and evaluating and reporting research), were hypothesized to affect teachers' research attitude and efficacy beliefs, as well as teacher efficacy. The two process

variables were assumed to be affected by the contextual variables and teachers' research motives. The first process variable 'planning and performing research' was assumed to effect the second process variable 'evaluating and reporting research'. Last, teacher efficacy was hypothesized to be affected by teachers' research attitude and efficacy beliefs.

Fit indices showed the hypothetical starting model to fit the data well (χ^2 = 1.179 with df = 3 (p=.76); the Comparative Fit Index (CFI) =1.00; the Tucker Lewis Index (TLI) =1.00; Root Mean Square Error of Approximation (RMSEA) =.00; Standardized Root Mean Square Residual (SRMR) =.03; see Table 5.2, model 1)[8]. While the hypothetical model fitted the data, many of the relations tested in this structural model were weak and statistically non-significant. Through excluding these non significant relations from the model (given the one-directionality assumed in the relations, these were tested one-sided (at p =.05)), a more economic parsimonious structural model emerged. The final structural model also provided an adequate fit to the data (χ^2 = 16.17 with df = 18 (p=.58); CFI=1.00; TLI=1.00; RMSEA=.00; SRMR=.08; see Table 5.2, model 2). Thus, the difference between model and data was non-significant: CFI and TLI were above the required value of .95. However, SRMR was above the required value of .05 indicating that there was some unexplained variance in the model. The standardized path coefficients and effect sizes (Cohen's effect size for correlation) were estimated for the final model (Kline, 2005).

Table 5.2

Model fit measures

Description	X^2	(df)	P-value	CFI	TLI	RMSEA	SRMR
Model 1							
Hypothetical starting model	1.18	3	.76	1.00	1.00	.00	.03
Model 2							
Final empirical model	16.17	18	.58	1.00	1.00	.00	.08

[8] X^2 describes the distance between model and data, but depends on the sample size. CFI and TLI describe the 'power' of the model compared to 'the situation without the model'. SRMR and RMSEA describe how much error or unexplained variance remain after fitting the model.

5.4 RESULTS

5.4.1 TEACHERS' PERCEPTIONS OF PRACTICE-BASED RESEARCH (RQ1)

In table 5.3, average scale scores, standard deviations, and Pearson correlations for the eight QTR scales are presented. The results show that for all QTR scales, except for the evaluating and reporting scale, respondents on average scored above the scale mean. Respondents scored highest with respect to the research motives scale. Also, regarding both outcome scales 'research attitude and efficacy beliefs', and 'teacher efficacy', respondents on average scored rather high. The respondents were somewhat positive with respect to the three context scales and the planning and performing research scale. With respect to the evaluating and reporting research scale, respondents scored medium/neutral (just below the scale medium). On average, the variance in respondents' scores was moderate. The partnership scale had the largest variance of all the eight scales, suggesting that, respondents varied most on this scale in their responses. Also the research infrastructure scale had a large variance, suggesting considerable differences between teachers and schools. For the planning and performing research scale, the smallest variance was found.

Pearson correlation coefficients (see table 5.3) ranged between .21 and .68. Strong correlations existed between the contextual input scales: between research culture and research infrastructure (.48); research culture and partnership (.54); and research infrastructure and partnership (.59). Also, between research infrastructure and evaluating and reporting practice-based research there was a considerable correlation (.54). Research motives correlated highly with the outcome scales (.56 and .53, respectively). Finally, there was a strong correlation between the two outcome scales (.68).

Table 5.3

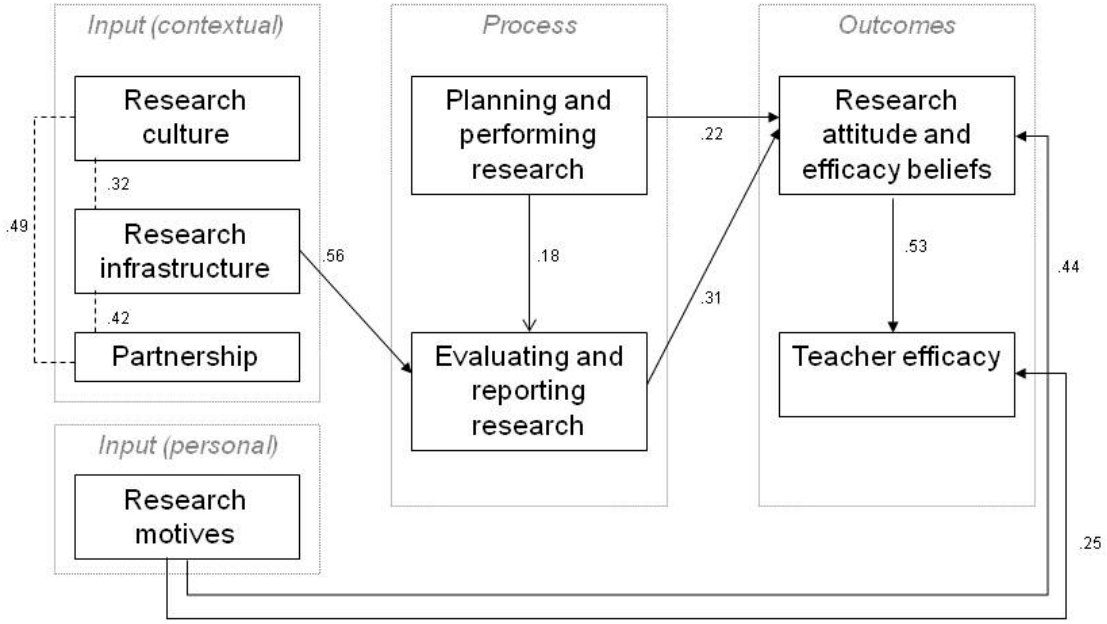
Average scale scores, standard deviations, and Pearson correlations between QTR scales

Domain	Scales	Mean (Std)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Input (contextual)	(1) Research culture	3.10 (.68)	-							
	(2) Research infrastructure	3.04 (.86)	.48**	-						
	(3) Partnership	2.93 (.96)	.54**	.59**	-					
Input (personal)	(4) Research motives	3.88 (.70)	.20	.21*	.12	-				
Process	(5) Planning and performing research	2.98 (.57)	.11	.13	.18	.17	-			
	(6) Evaluating and reporting research	2.38 (.73)	.17	.54**	.37**	.14	.35**	-		
Outcomes	(7) Teacher efficacy	3.43 (.68)	.22*	.13	.12	.56**	.31**	.11	-	
	(8) Research attitude and efficacy beliefs	3.54 (.64)	.28**	.38**	.37**	.53**	.33**	.39**	.68**	-

*Note: ** p < .01, * p < .05*

5.4.2 STRUCTURAL RELATIONS BETWEEN TEACHERS' PERCEPTIONS (RQ2)

In Figure 5.2, the final structural model (model 2) as well as the standardized path coefficients, are depicted.



Note: '→' signifies direct relations, '---' means an association between variables rather than a causal relation

Figure 5.2: *Empirical structural model of significant paths between measured variables*

The dotted lines in the figure concerned associations between variables rather than causal relations. The arrows between the different variables concern tested causal relationships. It should be noted, however, that because the date were collected at one moment in time, real causality cannot be tested. Hence, the model merely suggests logical paths between measured variables. The direction of the arrow represents the direction of the causality. Each relation depicted in the figure concerned a statistically significant relation between two variables. Besides all direct effects influencing the two process and outcome variables, several indirect effects occurred. These indirect effects emerged via different pathways in the structural model: for example, partnership has an indirect influence on evaluating and reporting research via research infrastructure but also via research culture (and research infrastructure). The total effects concern a total sum of the direct and indirect effects between two variables. In table 5.4, the direct, indirect and total

effects (cf. Verschuren, 1991) based upon Figure 5.2 are displayed. These effects are further explained below.

Table 5.4

Direct (D), indirect (I), and total effects (T) based on Figure 5.2

Domain and variables	Process						Outcomes					
	Planning and performing research			Evaluating and reporting research			Research attitude and efficacy beliefs			Teacher efficacy		
	D	I	T	D	I	T	D	I	T	D	I	T
Contextual input												
Research culture	-	-	-	-	.29	.29	-	.09	.09	-	.05	.05
Research infrastructure	-	-	-	.56	-	.56	-	.17	.17	-	.09	.09
Partnership	-	-	-	-	.32	.32	-	.10	.10	-	.05	.05
Personal input												
Research motives	-	-	-	-	-	-	.44	-	.44	.25	.23	.48
Process												
Planning and performing research	-	-	-	.18	-	.18	.22	.06	.28	-	.15	.15
Evaluating and reporting research	-	-	-	-	-	-	.31	-	.31	-	.16	.16
Outcomes												
Research attitude and efficacy beliefs	-	-	-	-	-	-	-	-	-	.53	-	.53
Teacher efficacy	-	-	-	-	-	-	-	-	-	-	-	-

Note: D: means direct effect, I: means indirect effect, and T: means total effect

5.4.3 DIRECT, INDIRECT AND TOTAL RELATIONS (RQ2A)

INPUT (CONTEXTUAL AND PERSONAL) – PROCESS

There are no direct or indirect effects of input variables (contextual and personal) on the planning and performing research variable in the structural model. With respect to the contextual input variables, only 'research infrastructure' had a medium direct effect (.56) on 'evaluating and reporting research' (total effect .56). Thus, the greater the presence of a research infrastructure was perceived by teachers, the more satisfied they were with research activities they performed. The other two contextual input variables only had a small indirect effect (via research

infrastructure or both other contextual variables and research infrastructure) on 'evaluating and reporting research'. 'Research culture' had an indirect and total effect of .29 and 'partnership' an indirect and total effect of .32 on evaluating and reporting research. The personal input variable 'research motives' did not have an effect (direct or indirect) on 'evaluating and reporting research'.

PROCESS

In the structural model there was a very small relationship between the two process variables. The planning and performing research variable had a direct effect of .18 on the evaluating and reporting research variable (total effect .18). Thus, the more teachers perceived to have been engaged in planning and performing research activities, the more they reported to have been engaged in evaluating and reporting their research.

PROCESS – OUTCOMES

The planning and performing research variable had a small direct effect of .22 as well as a very small indirect effect (via evaluating and reporting research) of .06 on 'research attitude and efficacy beliefs' (total effect .28). The second process variable 'evaluating and reporting research' only had a direct effect of .31 on 'research attitude and efficacy beliefs'. This means that the more teachers perceived their evaluating and reporting research activities as very well performed, the more they perceived improved research attitudes and efficacy beliefs. Both process variables only had an indirect effect on 'teacher efficacy'. The variable 'planning and performing research' had an indirect effect of .15 and the variable 'evaluating and reporting research' had an indirect effect of .16. Thus, the more teachers perceived their planning and performing research activities and their evaluating and reporting research activities as very well performed, the more they perceived increased teacher efficacy.

INPUT (CONTEXTUAL AND PERSONAL) – OUTCOMES

Given the aforementioned results, all contextual input variables only had indirect effects on both outcome variables (mainly via research infrastructure). Research culture had an indirect effect of .09, research infrastructure an indirect effect of .17, and partnership an indirect effect of .10 on research attitude and efficacy beliefs. Thus, the more teachers perceived the presence of the research culture, research infrastructure, and partnership at their schools, the more they perceived improved research attitudes and efficacy beliefs. Teacher efficacy was influenced indirectly by research culture (.05), research infrastructure (.09), and partnership (.05). Thus, the

more teachers perceived the presence of a research culture, research infrastructure and partnership at their schools, the more they perceived increased teacher efficacy. The personal input variable 'research motives' had a direct effect of .44 on research attitude and efficacy beliefs. This means that the more teachers perceived they had clear research motives, the more they perceived improved research attitudes and efficacy beliefs. With respect to the outcome variable 'teacher efficacy', 'research motives' had a direct effect of .25 as well as an indirect effect via research attitude and efficacy beliefs of .23 (total effect .48). This suggests that the more teachers perceived to have clear research motives, the more they perceived increased teacher efficacy.

OUTCOMES

Between both outcome variables there was a relationship as shown in the structural model. Research attitude and efficacy beliefs had a direct effect of .53 on teacher efficacy (total effect .53). Thus, the more teachers felt they were capable of conducting research, the more they felt they improved their teaching.

5.4.4 RELATIVE IMPORTANCE OF VARIABLES AND MODEL (RQ2B)

When the above described relations between the variables of practice-based research are compared to each other, the following trends emerged:

1. The influence of the research infrastructure variable on the planning and performing research variable and both outcome variables was two times stronger than that of the other two context variables (and moreover it was the only direct influence).

2. The research motive variable appeared four times more stronger in its effect on outcomes than the other input variables (i.e. contextual input variables); this suggests it can be regarded as more important than all the other context variables together.

3. Both process variables had double the effect on outcomes compared to the context variables. Compared to the research motives variable their effect was half that in size; but process variables did have a direct influence on outcomes.

The variance (*R2)* in evaluating and reporting research was explained for 35% by the three contextual input variables and planning and performing research. The variance in research attitude and efficacy beliefs was explained for 47% by the input variables (contextual and personal) and both process variables. The variance in teacher efficacy was explained for 36% by direct and indirect relations with all other variables.

5.5 CONCLUSION AND DISCUSSION

Overall, we found empirical evidence for most of the assumptions (frequently) mentioned in the literature. The developed empirical structural model fitted the data well and explained quite a lot of variance, in particular with respect to the process variable evaluating and reporting research (35%) and both outcome variables (respectively 36% for research attitude and efficacy beliefs, and 47% for teacher efficacy). Furthermore, we have gathered more insight into what (student) teachers themselves think about which concepts are important with respect to practice-based research outcomes in secondary education schools. Based upon the findings of this study we can draw three important conclusions.

First, the contextual input variables had mainly indirect effects on process and outcome variables. Only research infrastructure had a direct influence on the process variable 'evaluating and reporting research. This causal relation was the strongest relation in the total structural model (.56). The other contextual variables 'research culture' and 'partnership' appeared only marginally important and were mediated by 'research infrastructure', process and outcome variables. Based upon this finding we can draw the conclusion that the contextual variables are not that important in explaining teachers' perceptions of the practice-based research process and research outcomes as mentioned in some literature (Holmes Group, 1990; NCATE, 2001).

Second, we can conclude that both process variables do have an important influence on the outcome variables 'research attitude and efficacy beliefs' and 'teacher efficacy'. Both process variables directly influenced the outcome variable 'research attitude and efficacy beliefs'. The planning and performing research variable also had an indirect influence. Both process variables indirectly influenced teacher efficacy, via the mediating variable research attitude and efficacy beliefs. This finding does confirm findings from two of our prior studies (see chapters 3 and 4), that the practice-based research process (and its quality) is of major importance for obtaining both research outcomes.

Third, research motives have a direct influence on both outcome variables. This influence was up to twice as strong as the influence of the process variables. Based upon this finding we can draw the conclusion that besides the process variables research motives are also very important for obtaining both outcomes.

On the whole, the developed structural equation model seemed promising for investigating (student) teachers' practice-based research in schools. The empirical structural equation model showed several direct and indirect relations between perceived concepts associated with teachers' practice-based research in schools. From the strength of the relations, we can deduce what concepts and what relations between those concepts are relatively important for implementing practice-based research through teachers-as-researchers in secondary education schools.

First, schools that want to implement practice-based research as a professional learning activity, with outcomes regarding performing research as well as regarding teaching, should focus on teachers' and student teachers' motives for performing practice-based research and the practice-based research process itself, instead of investing in and focusing too much on the context for practice-based research in schools (research culture, research infrastructure and partnership). Successfully realizing practice-based research in schools starts with selecting teachers who are *interested* in research (results) and *eager* to perform practice-based research activities. Especially these teachers need to get inspired for researching their own educational practice as a professional learning activity. Therefore, schools should show them 'good practices' and convince them of the added-value of practice-based research activities for the education of pupils and for own professional learning as a teacher. Inspired teachers themselves should formulate the research questions: emerging from their own educational practice and leading to direct and observable improvements. Besides this, schools should show teachers how these good practices are established: what makes that these research projects are successful?

Second, while the context for practice-based research in schools is important the concepts and relationships between concepts in the structural model do explain some variance, research infrastructure is the most important variable. In the perception of the (student) teachers, research culture and partnership do have a strong coherence with the research infrastructure, but are more indirectly important for the process and outcomes of practice-based research in schools. Schools should thus focus first on realizing in-school structures directly important for performing practice-based research and realizing research outcomes.

The developed empirical structural model does fit the research data well, however, the percentages explained variance for the process and outcome variables of the model still showed some room for improvement. In this structural model we defined all concepts as latent variables due to the small sample size. Hence, measurement error for the different variables could not be accounted in the model. Further, the question remains if these are the only important concepts or that there are other also important concepts to be taken into account.

Besides this, in this study we investigated (student) teachers' perceptions of the concepts associated with practice-based research in schools via a questionnaire. Therefore, concepts were measured in a prescribed and structured manner, leaving no room for more personal descriptions. If (student) teachers did have a perception of other concepts (which we did not include in our questionnaire) these perceptions were not taken into account. It is also the question if (student) teachers do have a good image of all concepts questioned. The structural relations found in the model were prompted by teachers and student teachers as perceived at this moment. These relations can change in time with the development of practice-based research in schools.

CHAPTER

6

CONCLUSION AND DISCUSSION

6.1 AIM OF THE RESEARCH

This dissertation, investigated assumed (student) teachers' professional learning in secondary education schools through the performance of practice-based research, and the supposed supportive setting of a PDSs context for this learning. Four empirical studies were conducted for these purposes approaching the topic with qualitative and quantitative research methods. The studies focused on four aspects of (student) teachers' practice-based research: the environment for practice-based research in schools (contextual input); (student) teachers' motives for performing practice-based research (personal input); the performed practice-based research activities by (student) teachers (research process); and the results of the practice-based research (research outcomes).

This dissertation had three overarching aims: (a) mapping the concepts associated with (student) teachers' practice-based research in schools in terms of research input, research process, and research outcomes (study 1, study 2, study 3); (b) investigating the added-value of PDSs settings compared with non-PDSs settings (study 3); and (c) testing a hypothetical model that describes the relations between teachers' and student teachers' perceptions of the input (contextual and personal), process and outcomes of practice-based research, and with that, the relative importance of these different aspects (study 4).

In this dissertation four key questions were addressed. These key questions were related to the four studies in this dissertation.

1. What are participants' perceptions of the actual and preferred situation regarding practice-based research in Dutch PDSs? (Study 1)

2. What features characterize teachers' practice-based research activities and what is the impact of these activities in terms of quality standards and criteria, and learning outcomes? (Study 2)

3. Do PDSs make a difference in terms of (student) teachers' perceptions of input (contextual and personal), process and outcomes of in-school practice-based research? (Study 3)

4. What model explains the empirical relations that exist in (student) teachers' perceptions of factors associated with the input (contextual and personal), process and outcomes of in-school practice-based research? (Study 4)

In this final chapter, an overview of the main findings of the four empirical studies reported in chapters 2 – 5 is given and general conclusions to the research questions are formulated. This is followed by a discussion on the results and limitations of the research. The chapter concluded with a discussion on the implications of the research results and suggestions for future research.

6.2. MAIN FINDINGS

6.2.1 KEY QUESTION 1

'WHAT ARE PARTICIPANTS' PERCEPTIONS OF THE ACTUAL AND PREFERRED SITUATION REGARDING PRACTICE-BASED RESEARCH IN DUTCH PDSS?'

The aim of this first study was to obtain deeper insight into the realization of teacher research in PDSs in the Netherlands. Participants (e.g. school leaders, teachers and student teachers) of four schools were asked for their perceptions of the actual and preferred situation concerning teacher research in terms of the context, processes and outcomes of practice-based research activities by teachers-as-researchers. Through investigating participants' perceptions, we have gathered important information about how participants' perceive the actual realization of the context, process and outcomes of practice-based research in their PDSs and how they ideally would like to see this.

Based on our research results we can conclude that a large difference between the actual and preferred situation was noticeable. This implies that, according to

respondents, realizing the preferred context, process and outcomes of teacher research, was difficult. Participants (and participant groups) differed not only in their perception of the implementation process (the actual situation) but also in the (preferred) features for realizing teacher research they pointed out. When comparing respondents' perceptions to the literature, it seemed that most of the topics mentioned in the literature were present in respondents' views. Topics often mentioned in the literature that also returned in our interviews were elements such as: linking teacher research to school policy and student teacher supervision (e.g. Darling-Hammond, 2005), consciousness and reflection on own practice and practices of colleagues (Burton & Bartlett, 2005; Cochran-Smith & Lytle, 1999a; 2009; Ponte et al., 2004; Roberts et al., 2010; Zeichner & Noffke, 2001), using students as starting point and data source (Hoban & Hastings, 2006; Ponte, 2005), undertaking research collaboratively with peers, critical friends and in the context of learning communities (Cochran-Smith & Lytle, 1999b; Groundwater-Smith & Dadds, 2006), changed outcomes in terms of awareness of own practice (Cochran-Smith & Lytle, 1999a, 2009; Loughran, 2002; Zeichner & Noffke, 2001) and elaborated practical knowledge of teaching (Lunenberg et al., 2007; Zeichner & Noffke, 2001) and a changed attitude towards innovations (Cochran-Smith, 2008; Kincheloe, 2003; Zellermayer & Tabak, 2006). However, even though the content of perceptions to some degree resembled what was mentioned in literature, many elements seemed to be merely present in participants 'ideal images', but much less so in their perceptions of the actual situation. Furthermore, aspects were in the perception of teachers' implemented in very different degrees: for some elements respondents could not provide concrete examples or empirical evidence, while other elements had just been implemented (such as the constitution of learning communities).

When looking in more detail, it seemed there was a strong attention for the conditions for (or context dimension of) teacher research. This raises the question whether school leaders and teachers in schools were actively thinking about the innovation's content (second order change) or whether they were merely structuring and organizing it (first order change). As is known from the literature, for successful implementation secondary order changes are needed (Fullan, 2007). This also relates to the 'agency' and 'ownership' aspect of the innovation by teachers and schools (Bandura, 2001; Bergen & van Veen, 2004; Breiting, 2008; cf. Ketelaar, 2012): do teachers understand for what purpose they were doing practice-based research and were they using and applying this research to control their own functioning? Or were they involved just because they were given time, because it was part of their task/job description or because their school principals had told

them to do so? Were schools concerned with formulating what they really wanted with in-school teacher research or were they merely following policy makers? On the other hand, given the fact that the implementation of PDSs in the Netherlands has only recently begun (since 2007), it was not surprising that schools were still mostly concerned with the structural and organizational aspects.

A second notable finding in participants' perceptions was the apparent complexity of realizing a partnership between the different partners involved in the PDS. In our research, a significant discrepancy was found between perceptions of the 'ideal' and the 'actual' PDS in this respect. As is known from research on the implementation of PDSs (Darling-Hammond, 2005; Doolittle et al., 2008), it is very difficult to develop effective partnerships between schools and teacher education institutes. However, it is striking that the PDS participants in our study showed a strong external disposition: they attributed the failure of an effective partnership to shortcomings of the teacher training institutes rather than their own limitations. This may be a result of the fact that only participants working at the schools themselves were interviewed, rather than external participants (such as teacher educators or external researchers). Nevertheless, in a high quality partnership between different partners, all should be contributing to and take initiative with respect to the exchange and cooperation in the partnership, including the schools themselves.

Thirdly, the study stressed the importance of accomplishing a 'research oriented culture' at all levels of the school, including pupils. Participants several times mentioned the preferred realization of a learning organization with all teachers (and student teachers) involved in research, school development and supervision, if possible even members of the school leadership. This aligns with ideas brought forward by Berger, Boles, and Troen (2005), who mention elements for successful teacher research that at the same time form paradoxes during implementation: (1) teacher research should be mandated for all teachers if it is to have an impact on the culture of the school at large, but principals cannot force teachers to engage in teacher research; (2) the principal is a strong factor in the success or failure of teacher research as a school-wide reform, but the question of ownership is by the teachers; (3) there must be an outside actor with ideas, support, etc. (partner), but what if there is no partner or if the external partner has a questionable role?; (4) teachers need to learn research skills, but they don't always want to. Also, there is the risk that teacher research is limited to individual teachers or the learning communities, but that these communities are ignored by the broader school

context or even take a direction opposite to the mainstream school culture (Berger et al., 2005).

Additionally, although respondents stressed that pupils' learning and the quality of their education should be the central purpose and outcome of research in the PDS, striking is the fact that pupil results made a very small portion of all participants' perception statements (both actual and preferred). At this moment, pupil learning and outcomes seemed not to be a central focal area of the participants. This suggests that (at this moment) at least within these four schools there is a shift needed with respect to the purpose of conducting in-school teacher research: from a focus on the contribution of research to school learning and school development to more emphasis on the professional learning of teachers and - as a result – the improved learning and learning results of pupils.

6.2.2 KEY QUESTION 2

'WHAT FEATURES CHARACTERIZE TEACHERS' PRACTICE-BASED RESEARCH ACTIVITIES AND WHAT IS THE IMPACT OF THESE ACTIVITIES IN TERMS OF QUALITY STANDARDS AND CRITERIA, AND LEARNING OUTCOMES?'

In the second study, the characteristics and impact of teachers' practice-based research were studied in two PDSs. Three reliable and valid coding instruments for the analysis of teacher' practice-based research in PDSs, were developed. The study should be considered as a first step in this direction, as it was limited to the research practice of six teacher-researchers, and only examined the earliest period of having teachers conduct practice-based research in PDSs in the Netherlands.

Two conclusions can be drawn with regard to the characteristics of the teachers' practice-based research projects. First, the results for the context and content characteristics of the six practice-based research projects showed projects that were clearly embedded in the teachers' own educational practices and these projects thus started from the teachers' own research questions to bring about perceptible improvements, such as changed procedures, materials or didactics. In other cases, practice-based research was more policy oriented and such studies only produced recommendations and thus no improvement. As both Elliott (2008) and Day (1999) have argued, self-determination and autonomy (i.e., ownership) are key aspects or hallmarks of professional behavior. Second, the discourse characteristics of the teachers' practice-based research projects differed considerably. Some of the teachers perceived their research environments as more supportive and having more possibilities for peer review, collaboration, exchange of

research experiences and discussion than others did. This result confirms findings from the first study (see chapter 2). In the second study, all of the research projects were individual projects, often with little or no collaboration, sharing of experiences, opportunities for discussion or peer review. The question is whether schools in general (and PDSs in particular) are aware of the supportive structures that teacher-researchers need to conduct practice-based research and whether the means and resources are available for the schools to realize such a supportive structure.

With respect to the quality of the practice-based research conducted by the teachers, their research reports showed this to be frequently less than satisfactory. Difficult research activities for teacher-researchers were for example: clear and precise formulation of the problem and research questions, making visible what they did and why they did it the way they did it (methods and procedures for the collection of the data and analyses of the data were often missing), and the articulation of the implications/consequences of their research results for themselves or for others. This is in line with the findings of Zeichner and Noffke (2001), who also found the research teachers conducted in schools to not be at an acceptable level. Zeichner and Noffke (2001) argue that teachers often are not being trained to conduct research and are being generally unfamiliar with such basic research techniques as reviewing the literature and moving in a professional social network with colleagues (whether or not researchers) for peer reviewing and receiving feedback. The issue that arises then is whether teachers can be trained well enough in light of today's limited resources and teachers' primary task, namely educating pupils, to conduct high-quality, practice-based research in schools. Making the quality of their practice-based research visible for others, appeared also to be difficult for teachers.

With respect to teachers' perceived learning outcomes, the interviews showed the different perceived learning outcomes to remain most times close to the teachers themselves: changed attitudes, increased awareness, changed acting. If possible consequences and/or changes for the educational practices of others were mentioned as an outcome or implication, these were quite limited and generally formulated. High-quality, practice-based research does not, thus, mean immediate change or direct improvement of educational practice: teachers need also to be able to change their practices on the basis of their own research findings and experiences.

6.2.3 KEY QUESTION 3

'DO PDSS MAKE A DIFFERENCE IN TERMS OF (STUDENT) TEACHERS' PERCEPTIONS OF INPUT (CONTEXTUAL AND PERSONAL), PROCESS AND OUTCOMES OF IN-SCHOOL PRACTICE-BASED RESEARCH?'

In the third study, the Questionnaire on Teacher Research (QTR) was developed to analyze experienced teachers' and student teachers' perceptions of practice-based research in their secondary education schools. Analyses showed the QTR to be a useful, reliable and valid tool for assessing teachers' perceptions of their research efforts. The respondents were asked for their perceptions of practice-based research in terms of input (contextual and personal), process and outcomes. In the study, differences in perceptions between teachers of PDSs and non-PDSs were investigated. Based upon the results we can draw two important conclusions.

First, respondents scored on average highest with respect to their research motives and the outcomes of practice-based research. The average scores for the three contextual input scales were lower, and scores for the two research process scales the lowest. Those findings are in line with those of the first two studies in this dissertation.

Second, the results showed PDS teachers scoring higher for all eight QTR-scales compared to non-PDS teachers. Differences between PDSs and non-PDSs were large for partnership, research infrastructure and for teachers' research attitudes and efficacy beliefs. Thus, teachers from PDSs perceived more influence of partnerships, noticed a larger availability of means and opportunities to conduct research and felt they had more expertise in conducting research than teachers from non-PDSs. Furthermore, the results also showed statistically significant differences between PDSs and non-PDSs for research culture and for evaluating and reporting research. After taking into account teacher experience, differences remained. Only the difference for teachers' research attitudes and efficacy beliefs became less strong and a new, statistically significant difference for planning and executing research emerged. So, the teaching experience of the respondents hardly affected differences in perceptions between PDSs and non-PDSs. Based on these results it can be concluded that, in terms of teachers' perceptions, PDSs do matter and that teachers perceive such schools as more positive environments for research.

In line with our prior studies, the differences found between PDSs and non-PDSs could again be interpreted as mainly first order changes: these are changes in practices (Fullan, 2007) without underlying changes in beliefs. As can be seen, differences mainly occurred in the contextual elements and research outcomes. So-

called second-order changes, encompassing teachers' fundamental beliefs about current educational practice, leading to new goals, motives, or roles, were limitedly visible when looking at differences between PDSs and non-PDSs. The fact that first-order changes were found in this study aligns with findings of prior studies showing that teachers in the earlier years of an educational innovation mainly focus on structuring the innovation and not so much on the meaning of this innovation for their own professional learning (see also chapter 2).

6.2.4 KEY QUESTION 4

'WHAT MODEL EXPLAINS THE EMPIRICAL RELATIONS THAT EXIST IN (STUDENT) TEACHERS' PERCEPTIONS OF FACTORS ASSOCIATED WITH THE INPUT (CONTEXTUAL AND PERSONAL), PROCESS AND OUTCOMES OF IN-SCHOOL PRACTICE-BASED RESEARCH?

In the fourth study, relations between different variables related to practice-based research as perceived by (student) teachers were investigated by means of structural equation modeling (SEM). The focus in this study were teachers' perceptions with respect to the realization of the research environment at the school ('contextual input'), the motives for performing practice-based research ('personal input'), the satisfaction of teachers with the performed research activities ('process'), and the (learning) results of these research activities ('outcomes') as measured with the Questionnaire on Teacher Research (QTR) (see also chapter four). Based upon the findings we could build an empirical structural model fitting the data well, with paths between associated variables of practice-based research.

Overall, empirical evidence was found for most of the assumptions (frequently) mentioned in the literature. The developed empirical structural model fitted the data well and explained quite a lot of variance, in particular with respect to the process variable evaluating and reporting research (35%) and both outcome variables (respectively 36% for research attitude and efficacy beliefs, and 47% for teacher efficacy). Furthermore, more insight was obtained into what (student) teachers themselves think about which concepts are important with respect to practice-based research outcomes in secondary education schools. Based upon the findings of this study we can draw three main conclusions.

First, the contextual input variables mainly had indirect influence on process and outcome variables. Only research infrastructure had a direct influence on the

process variable 'evaluating and reporting research. This path was the strongest relation in the structural model (.56). The other contextual variables 'research culture' and 'partnership' only marginally influenced outcomes and were mediated by 'research infrastructure' and process variables. Based upon this finding we can draw the conclusion that the contextual variables seemed not that important in explaining teachers' perceptions of the practice-based research process and research outcomes as our first two studies seemed to suggest.

Second, we can conclude that both process variables did have an important influence on outcome variables. Both process variables directly influenced the outcome variable 'research attitude and efficacy beliefs', the planning and performing research variable also indirectly. Both process variables indirectly influenced teacher efficacy, via the mediating variable research attitude and efficacy beliefs. This finding aligned with our finding from study 2 (see chapter 3), that the practice-based research process is of major importance for obtaining both research outcomes.

Third, research motives had a direct influence on both outcome variables. Certainly with respect to 'research attitude and efficacy beliefs' the research motives variable had a clear direct influence (.44). This influence was up to twice as strong as the influence of the process variables on research attitude and efficacy beliefs. Based upon this finding we can draw the conclusion that besides the process variables research motives are also very important for obtaining both outcomes.

6.3. GENERAL CONCLUSIONS AND DISCUSSION

By means of the four different studies, empirical evidence was found in our research for most of the assumptions underlying this dissertation, namely that (student) teachers' research motives play an important role in performing in-school practice-based research activities, that as a result of these practice-based research activities (student) teachers learn professionally, that PDSs are a supportive context for this learning, and that pupils' learning and learning results improve as a result of this (see Figure 6.1).

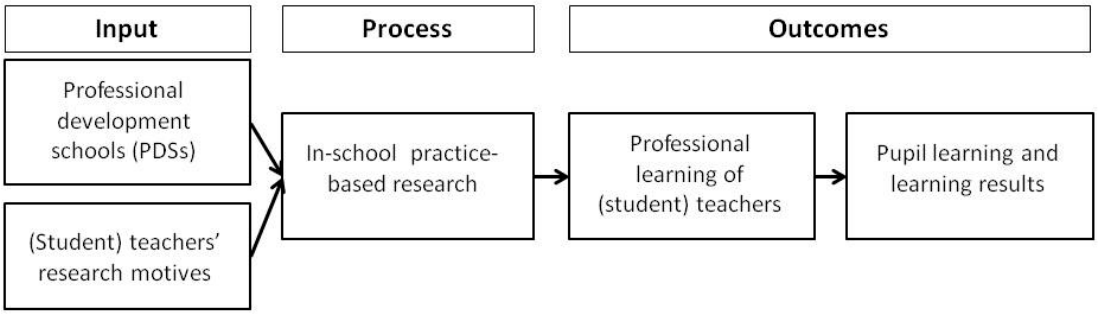


Figure 6.1: *Assumed relations between components of practice-based research in PDSs*

Across the four studies, three important conclusions can be drawn with respect to the realization of (student) teachers' practice-based research in secondary education schools, and PDSs in particular.

First, it was found that schools when realizing practice-based research through (student) teachers-as-researchers, particularly focus on the realization of a research environment in their school organization (i.e. conditions for performing in-school practice-based research).

Second, performing practice-based research in these schools appeared not to be an easy process for (student) teachers. (Student) teachers participating in this research did put much time and effort in doing practice-based research, but also indicated that performing practice-based research in schools sometimes was difficult: because of limited time (besides their primary teaching task) available for performing practice-based research, because of lacking certain research knowledge and skills, and because expectations and requirements were not always clear. Practice-based research by (student) teachers does not lead straightforwardly to improvements in schools and classrooms (Cochran-Smith & Zeichner, 2005).

Third, from the outcomes of the different studies it could be concluded that (student) teachers perceived different (learning) outcomes of their practice-based research, both with respect to performing practice based research as well as with respect to their teaching.

Looking back at our findings, we can also respond to the second part of our problem definition. Based on the results of study 3 it can be concluded that in terms of (student) teachers' perceptions, PDSs do matter. The (student) teachers investigated in our study perceived such schools as more positive environments for performing practice-based research. Also, from the first and second study we can conclude that PDSs seemed to have more favorable conditions for performing

practice-based research compared with non-PDSs. However, looking at the quality of teachers' practice-based research in these PDSs, this did not yet meet the criteria mentioned in the literature, such as the criteria mentioned by Verschuren (2009a, 2009b). Also with respect to the outcomes of these practice-based research projects, there appeared considerable room for improvement.

6.3.1 THE PROFESSIONAL-DEVELOPMENT-SCHOOL CONTEXT

FIRST ORDER CHANGES VERSUS SECOND ORDER CHANGES

The first study in this dissertation showed, there was a strong attention for the realization of conditions for (student) teachers' practice-based research in schools or, in other words, contextual input, both with respect to the perception of the actual situation as well as with respect to the perception of the preferred situation. This finding confirms that schools in the early years of realizing an educational innovation mainly focus on structuring and organizing the innovation so-called first-order changes and not so much on the meaning of this innovation for own professional learning, the so-called second-order changes (Fullan, 2007). Also Timmermans (2012) did found in her study on the quality of Dutch professional development schools that these schools were organized structure-wise (first-order changes), however, this leads to different implementations for each school. Content-wise this implementation appears to be more difficult (second-order changes).

However, for successful implementation, secondary order changes are needed (Fullan, 2007). In study 3, these second order changes, encompassing teachers' fundamental beliefs about current educational practice (leading to new goals, motives or roles) were limitedly visible when looking at differences between PDSs and non-PDSs. Moreover, as the empirical structural model developed in study 4 showed, for the outcomes of (student) teachers' practice-based research (with respect to both performing practice-based research as well as teaching), the research process itself and (student) teachers' research motives played a more important role (i.e. they had a stronger direct influence). Schools realizing practice-based research in their schools should thus focus more on the research process itself and research motives of (student) teachers than on realizing the research context.

For realizing practice-based research as an educational innovation, agency and ownership of the concept by schools and teacher-researchers are important aspects. Do teachers understand for what purpose they were doing practice-based

research and were they using and applying this research to control their own functioning? Were schools concerned with formulating what they really wanted with in-school teacher research or were they merely following policy makers? The question of ownership is by the teachers wanted to perform practice-based research (Berger et al., 2005). Principals cannot force teachers to engage in research (Berger et al., 2005). The results of study 2 showed outcomes were more likely to occur if practice-based research projects were embedded in teachers' own educational practice and started from own research questions. This is also why teachers' motives for performing practice-based research are important. The structural model in study 4 showed the direct influence of research motives on both outcome variables.

NEW PHENOMENON

In the first study where participants' were asked for their perceptions of practice-based research in PDSs, large differences between the perceived actual and preferred situation appeared to exist. This means, according to the respondents that realizing the preferred context, process and outcomes of teacher research was difficult. Also, in the questionnaire responses of study 3 asking for (student) teachers' perceptions of input, process and outcomes of practice-based research, the contextual input variables (research infrastructure, research culture and partnership) were scored lower than other variables (less positive). It seems, thus, that the preferred ideal learning environment for practice-based research is not yet realized in these schools. This finding can be explained from the fact that at the moment of the investigation, the implementation of practice-based research in these schools as an educational innovation had just started. Implementing such a complex educational innovation needs time.

From the first study it appeared that participants differed not only in their perception of the implementation process (the actual situation) but also in the (preferred) features for realizing teacher research they pointed out. Many elements of the PDS seemed to be merely present in participants 'ideal images' but much less so in their perceptions of the actual situation. This can be explained from the fact that while practice-based research has been introduced in these schools, both in theory as well as in practice an explicit and clearly defined concept of the PDS and practice-based research in schools is lacking, which obviously impacts teachers' objectives, expectations, standards or implementation of practice-based research in these schools. On the other hand, this state of affairs implies that schools had much space for experimentation and a more localized interpretation of the concept in

their schools. This may have contributed to differences in implementation between schools, and as a consequence, differences in teachers' perceptions.

Irrespective of these concerns, in terms of (student) teachers' perceptions of practice-based research in secondary education schools, PDSs do matter and (student) teachers participating in this research perceive such schools as more positive environments for performing practice-based research. Questions that still remain, concern the actual added-value of this new phenomenon in terms of school development or pupil learning and learning results.

REALIZING IN-SCHOOL RESEARCH ENVIRONMENTS

Furthermore, as shown in the first study, the actual implementation of aspects associated with practice-based research in PDSs was perceived differently between different participants and some of them mentioned implementation without concrete examples or empirical evidence. Between different PDSs, there were differences visible in (to be) realized aspects of practice-based research (for example realizing learning communities in some of the PDSs). Study 2 showed a wide variety between different research projects within PDSs and between different PDSs with respect to the discourse function of practice-based research.

With respect to the balance between effort and outcomes, the question is whether schools in general and PDSs in particular are aware of the supportive structures teacher-researchers need to conduct high-quality practice-based research and whether the means and resources are available for schools to realize such a supportive structure. The structural model developed in study 4 showed mainly research infrastructure to have a strong direct influence on the research process (evaluating and reporting research) and (indirectly) on research outcomes. In the perception of (student) teachers, research culture and partnership did have a strong coherence with the research infrastructure, but were more indirectly important for the process and outcomes of practice-based research in their schools (study 4).

From the context variables, the partnership is what sets PDSs apart from other schools. However, the added value of realizing these partnerships turned out to be contradictory in the results of the different studies in our research. In the first study, the largest part of the context-related statements of participants regarding the preferred PDS, involved the preferred partnership between schools and teacher education institutes. In their perceptions of the actual situation they were not (yet) that positive about the cooperation between the partners in the current partnerships. According to the participants in this study, these partnerships were difficult to realize. In the third study, (student) teachers were asked for their

perception of realized partnerships in their secondary education schools. Differences between PDSs and non-PDSs teacher' perceptions were large with respect to the aspect partnership. However, in study 4, only research infrastructure had a direct influence on process and research outcomes (though indirectly for the latter). Partnership was thus mediated in its effect on research outcomes by the research infrastructure variable and by research process variables.

6.3.2 PERFORMING IN-SCHOOL PRACTICE-BASED RESEARCH

PRACTICE-BASED RESEARCH ACTIVITIES IN SCHOOLS

The first study showed that the research process and its features and content were not so much present in the heads of people, both with respect to their perception of the actual situation as well as the preferred situation. In study 3 these process variables also showed the lowest scores: respondents perceived their performance of certain research activities and their satisfaction with respect to this performance low. However, from the structural model analysis of study 4 it became clear that process variables 'planning and performing research' and 'evaluating and reporting research' were both directly and indirectly important for the realization of research outcomes, both with respect to research as well as teaching.

Additionally, the analysis of teachers' research reports in study 2 showed the quality of the practice-based research conducted by the teacher-researchers to be frequently less than satisfactory. The study showed that improvements are necessary, particularly with respect to the technical and implemental phase of their research projects. The teachers in our study devoted considerable effort to the conduct of their practice-based research but our results showed the realization of high-quality research to be difficult for these teachers. The issue that arises is whether practicing teachers can be trained well enough in light of today's limited resources and teachers' primary task, namely educating pupils, to conduct high-quality, practice-based research in schools. Furthermore, it is often mentioned (see for example Earl & Katz, 2006) that every teacher should develop a critical research attitude regarding own educational practice. The question is if that is possible resulting from the performance of once-only research projects (as it is now most times the case in our research), or should it be continuous, repeated more often? This is also related to teachers' motives for performing practice-based research: is practice-based research as a professional learning strategy the best matching professional development activity for all teachers?

Sometimes schools realized practice-based research from which in advance already fewer improvements could be expected: research with only a recommendation function, quite distant from the educational practice of teachers, without or with only limited ownership from the teachers themselves concerning the topic of the specific research. Lack of such ownership is not favorable for developing teachers' critical research attitude, reflecting on their own educational practice. Obtaining insight into the own educational practice and the improvement of own teaching are important objectives (i.e. preferred outcomes) for the realization of practice-based research in schools and important motives for (student) teachers to perform practice-based research.

In conclusion, with respect to the practice-based research process of the teacher-researchers, there are improvements necessary with respect to the quality of their practice-based research activities, which is also important because it stipulates the impact of the practice-based research in schools.

ASSESSING RESEARCH QUALITY

Besides the issue of equipping teachers as successful practical researchers, the difficulty of determining the quality of teachers' practice-based research arises. Comparing and determining research quality (or success) is complicated as contexts and content differ between research projects and PDSs (study 2). Several authors have proposed possible standards for determining quality of practice-based research (Altrichter et al., 1993; Anderson & Herr, 1999; Copabianco & Feldman, 2006; Elliott, 2007; Oancea & Furlong, 2007; Verschuren 2009a, 2009b), but for researching teachers themselves a concrete reference for or example of good and successful practice-based research is often missing. This, together with their unfamiliarity with (practice-based) research makes it difficult for the teacher-researchers in our study to make the quality of their practice-based research projects visible for others.

6.3.3 (LEARNING) OUTCOMES OF PRACTICE-BASED RESEARCH

PROFESSIONAL LEARNING THROUGH PRACTICE-BASED RESEARCH

Considering the results of our research, the question arises 'what actually is the added-value of practice-based research through experienced teachers in schools as a professional learning strategy compared to other professional development activities. Practice-based research is frequently defined as a deeper form of reflection by means of which own educational practice is systematically examined.

To stipulate the added-value of this professional learning strategy, (learning) outcomes of teachers' practice-based research projects are important. Learning is understood here as a change in teachers' cognitions – including their beliefs – and/or behavior (Zwart et al., 2007). In the different studies in this dissertation, teachers, student teachers and even school leaders were asked for their *perceived* (learning) outcomes following practice-based research in their schools. With respect to (student) teachers' professional growth, improved learning as well as changed behavior (although small scale and mentioned in a more general sense) were perceived as results of their practice-based research. However, these perceived outcomes may not or only partially correspond with what can be observed in practice: teachers may overestimate their professional growth as differences may occur between actors and observers, and between teachers, pupils or external observants (den Brok, Bergen & Brekelmans, 2006; Wubbels, Brekelmans, den Brok & van Tartwijk, 2006). Teachers may not be conscious about (aspects of) their learning (implicit, unconscious learning), they may not be able to make the distinction between different learning outcomes when it comes to the effects of practice-based research, or it may be that the occurrence of certain learning outcomes takes more time than was available in our study and because the practice-based research programs were relatively new. Changes in behavior are known to take time and effort (Ajzen, 1985). This may also be an explanation for the fact why the perceived learning outcomes as mentioned in study 2, most times remained close to the teachers themselves.

PUPIL LEARNING AND SCHOOL DEVELOPMENT

Although respondents stressed that pupils' learning and the quality of their education should be the central purpose and outcome of research in PDSs, pupil results made a very small portion of all participants' perception statements (as investigated in study 1). At this moment, pupil learning and outcomes seemed not to be a central focal area of the participants. This can be explained by the earlier-mentioned stage of implementing practice-based research in schools as an educational innovation. Also, pupil learning and learning results are difficult to determine and many other factors than practice-based research affect these variables as well.

If possible consequences and/or changes for the educational practice of others are mentioned as an outcome or implication of the teachers' practice-based research, these emerged as quite limited and formulated in a general sense (see study 2). Teacher-researchers in our research only provided limited insight into the

implications of their research outcomes for others. Moreover, high-quality, practice-based research cannot be expected to lead to immediate change or direct improvement of educational practice: teachers need to be able to change their practices on the basis of their own research findings and experiences and schools should allow and support teachers to implement these implications and changes. Besides this, improvements in/of educational practice frequently appear more small-scale and more or less 'unconscious', so-called 'diffuse implementation'. It is possible that teachers do not see the importance of these improvements and for this reason do not appoint them as learning outcomes of their practice-based research projects. The question thus remains what the actual influence of (student) teachers' practice-based research is with respect to school development and, ultimately, the learning and learning results of pupils.

6.4 STRENGTHS AND LIMITATIONS

The studies described in this dissertation have its strengths and limitations. One of the strengths is its multi-method approach with both quantitative (i.e. questionnaire) and qualitative (i.e. semi-structured interviews, document analysis) research methods and the participation of different respondent groups in the research (i.e. school leaders, teachers, and student teachers). A second strength is the development of useful, reliable and valid research and analysis instruments such as the coding system of study 1, the rating instrument of study 2, and the Questionnaire on Teacher Research of study 3 and 4. A third strength concerns the both descriptive as well as explanatory character of the different studies in this dissertation.

Besides these strengths our research has also some limitations. Based on the limitations of the present studies, some suggestions for future research can be formulated. In the next section these limitations regarding the research sample, the research instruments and variables, and the research design and analyses, will be further discussed.

6.4.1 RESEARCH SAMPLE

EXTENSION OF THE RESEARCH SAMPLE

The findings in this dissertation are based on a limited number of schools and respondents participating in the different studies of this research. This means that the generalisability of the findings is relatively low. In the first study, semi-structured interviews with 24 participants of four PDSs in one Dutch partnership were used to map participants' perceptions of actual and preferred situation with respect to practice-based research in schools. The question is to what extent these respondents and schools were representative for the implementation of practice-based research in secondary education schools in the Netherlands. In the second study, the research practice of six teacher-researchers, a relatively small and selective sample, concerning finished and reported research projects and thus probably more successful than those unfinished projects, was investigated. Again, the question is if these were representative for the performance of practice-based research in (Dutch) PDSs. For the benefit of study 3 and 4, the Questionnaire on Teacher Research was developed and administered. In study 3, the perceptions of 74 PDSs and non-PDSs (student) teachers with respect to four aspects of practice-based research (contextual input, personal input, process and outcomes) were compared. The subgroups in this sample (PDSs teachers, PDSs student-teachers, non-PDS teachers, and non-PDS student teachers) were rather small in size and, besides this, varied in composition with respect to gender, experience, subject taught, among other things. Last, the structural equation model in study 4 was developed with the research data of a sub sample (N = 56) of the sample from study 3. Again, given the voluntary participation and fact that questionnaires were administered online, little can be inferred about non-response or specific characteristics of participating teachers. In future research, investigating or comparing a larger sample of practice-based research projects and researching (student) teachers in secondary education schools (and particularly PDSs) could suggest the uniqueness or stability of the findings of the studies in this dissertation.

BROADENING OF THE RESEARCH SAMPLE

In the first study a distinction was made between two types of perceptions: actual and preferred perceptions. Moreover, in three (of the four) studies, perceptions of different participant groups were included: in study 1 school principals', teachers' and student teachers' perceptions, in study 3 and 4 both the perceptions of teachers as well as student teachers. Together this led to a more comprehensive

picture of what is seen (by participants) as a 'conductive' implementation of teacher research at their schools. However, perceptions of participants of schools of teacher education were not collected in any of the studies. This would be a useful addition for future research and provide an even more complete and comprehensive picture, in particular with respect to elements related to the partnership or to the quality and supervision of research (activities).

6.4.2 RESEARCH INSTRUMENTS AND VARIABLES

IMPROVEMENT OF RESEARCH INSTRUMENTS

In this study we investigated (student) teachers' perceptions of the concepts associated with practice-based research in schools via a questionnaire. The Questionnaire on Teacher Research (QTR) was shown to be a reliable and valid instrument (study 3 and 4). Nevertheless, there is certain room for improving the questionnaire. Such efforts could, for example, be directed at expanding the questionnaire on the process and outcome variables, which now sometimes seemed to merge together, but which – given the theory – should be more distinctive. Future research should further refine and test the QTR, by using input from observations, qualitative data and case studies.

By means of the QTR, concepts were measured in a prescribed and structured manner, leaving little room for more personal descriptions. If (student) teachers did have a perception of other concepts (which we did not include in our questionnaire) these perceptions were not taken into account. It is also the question if (student) teachers did have a good image of all concepts questioned.

In addition, the developed empirical structural model in study 4 fitted the data well, but the percentages of unexplained variance for the process and outcome variables of the model still showed some room for improvement. Perhaps, other variables could be included and linked to these process and outcomes variables to see if they can explain additional variance.

In the structural model we defined all concepts as latent variables due to the small sample size. Hence, measurement error for the different variables could not be accounted for the model, but with larger samples this also could be included in the model. Further, the question remains if these are the only important concepts or that there are other also important concepts to be taken into account.

REPORTS AS REPRESENTATIVES OF RESEARCH PERFORMANCE

While the teachers' research reports are an important source of information, it can be discussed if the reports adequately represent the details of teachers' research endeavors. It is conceivable that teachers conducted high-quality, practice-based research but simply did not report this adequately. Alternatively, it can be imagined that teachers described their research results more positively than the research allowed for. In other words, teachers' research reports may be susceptible to bias and the question is to what extent their research reports are valid representations of their actual research activities.

EXTENSION OF THE RESEARCH METHODS

In future research, using other types of research instruments (besides perceptions) – such as observations and pupil achievement or attitude tests – can be useful for obtaining insight into the effects of teacher research in Dutch PDSs and differences between what is in the heads of involved participants and what is visible to outsiders. In addition, pupil tests could help detect the actual effect of teacher research on the learning of pupils.

6.4.3 RESEARCH DESIGN AND ANALYSIS

(STUDENT) TEACHERS' PERCEPTIONS

Most of the data collected in the four studies in this dissertation concerned (student) teachers' perceptions of practice-based research in secondary education schools; instruments such as semi-structured interviews and the Questionnaire on Teacher Research (QTR) were used to collect these perceptions. Information regarding participants' perceptions with respect to the actual and preferred situation of practice-based research in PDSs was investigated by means of semi-structured interviews (study 1). With regard to how teachers perform practice-based research, we relied on teacher-researchers research reports (study 2) and the questionnaire-items asking for (student) teachers' performance of and satisfaction with certain practice-based research activities (study 3 and 4). Information about the perceived learning outcomes of practice-based research were elucidated from the semi-structured questionnaires in study 2 and from the questionnaire-items asking for (student) teachers' perceived learning outcomes with respect to performing practice-based research as well as their teaching in educational practice (studies 1, 3 and 4). Data on the characteristics of teachers' practice-based research projects were drawn from both teachers' research reports (content and context) as

well as from the semi-structured interviews in which teacher-researchers were asked for the discourse function of practice-based research with respect to the perceived learning outcomes. Last, perceptions of the research environments in secondary education schools (and PDSs in particular) were gathered by means of the semi-structured in study 1 and the Questionnaire on Teacher Research in study 3 and 4.

Several difficulties can be formulated with respect to investigating participants' perceptions. Do (student) teachers have a good and complete image of each aspect of practice-based research? Also, the degree of social desirability in answering is difficult to determine. People concerned with the implementation of practice-based research in schools have a certain interest in the success of realizing the educational innovation. Last, using self-perceptions entails the danger of differences arising between what teachers say they do and what they actually do. For example, we know that the perceptions of teachers and school leaders often differ from observations by external observers or pupils (e.g. den Brok et al., 2006; Fraser, 1994).

FOCUSING ON INTERRELATIONS

In this research, both quantitative and qualitative research methods were used to investigate (student) teachers' practice-based research in secondary education schools and PDSs in particular. In this way we aimed for both depth and breadth information about the research topic. In future research, findings of the different research methods could be linked to detect any associations.

The analyses in the second study were conducted for each research question separately. Our impression, however, is that the type of research undertaken by the teachers and particularly the quality of the research undertaken by the teachers were closely related to their learning outcomes. Future research should thus further investigate the interrelations between the characteristics of teachers' practice-based research, the quality of their practice-based research and the learning outcomes resulting from practice-based research.

EXTENSION OF THE RESEARCH PERIOD

A second limitation in terms of design relates to the time of investigation. Practice-based research by (student) teachers-as-researchers in Dutch secondary education is a relative new phenomenon and schools and (student) teachers are just making oneself familiar with their researching role. Starting the research at the beginning of realizing this practice-based research as a professional learning activity in schools

had the advantage that it could offer schools and (student) teachers the tools to evaluate their viewpoints and (intended) actions with respect to in-school practice-based research. The disadvantage, however, is that we did not find the desired high-quality practice-based research, nor the learning outcomes and changed behaviors we would like to see. The structural relations found in the structural model were prompted by teachers and student teachers as perceived at this moment. Finally, these relations can change in time with the development of practice-based research in schools. Longitudinal research could provide more insight into the ways schools realize and extend practice-based research in their schools and how (student) teachers develop their research role.

BROADENING OF THE RESEARCH FOCUS

Our research was directed at the first two elements of the chain (see Figure 6.1): namely (student) teachers' professional learning through practice-based research activities and the added-value of the PDSs context for this learning. Broadening the research focusing on the second part of the chain, namely pupil learning and learning outcomes following (student) teachers professional development as a result of performing practice-based research activities (which was marginally included in this research, only as perceived learning outcome), would be a relevant direction for future research.

6.5. PRACTICAL IMPLICATIONS

6.5.1 FOR THE REALIZATION OF PRACTICE-BASED RESEARCH IN PDSS

Based upon the findings of our research we suggest that schools that wish to implement practice-based research as a professional learning activity focus on teachers' and student teachers' motives for performing practice-based research and the practice-based research process itself, instead of investing in and focusing too much on the context for practice-based research in schools (research culture, research infrastructure and partnership). The results of the third study suggested several aspects of practice-based research in the participating schools that show room for improvement: the scales where no significant differences were visible between PDSs and non-PDSs (e.g. research motives, teacher efficacy) and the scales with the lowest scores (e.g. the two process scales and the partnership scale).

First, these schools should ensure that motivated teachers are enabled to perform practice-based research. Successfully realizing practice-based research in schools starts with selecting teachers who are *interested* in research (results) and *eager* to perform practice-based research activities. Especially, these teachers need to get inspired for researching their own educational practice as a professional learning activity. Therefore, these schools should show them 'good practices' and convince them of the added-value of practice-based research activities for the education of pupils and for own professional learning as a teacher, so that teachers will *continuously* perform and apply their research competence integrated with their teaching practice in classrooms.

A second implication for these schools implies that the topics of research should be close to the practice of the teacher-researcher themselves. Inspired teachers themselves should formulate the research questions. It are the questions and problems originated from their own practices that teacher-researchers experience ownership about and which motivates them to strive for realizing improvements or search for solutions. Teacher-researchers must be given the opportunity to implement these improvements in their own educational practice so that they can become effective change agents in their school organizations.

Besides this, as a third implication, these schools should show teacher-researchers how good practices are established: what makes that these research projects are successful and what means research quality in these?

6.5.2 FOR (STUDENT) TEACHERS' PRACTICE-BASED RESEARCH ACTIVITIES

The studies in this dissertation suggested a particular need for the participating schools to be more focused on the quality and knowledge with respect to conducting research. The six teacher-researchers in the second study devoted considerable effort to the conduct of their practice-based research, but our results showed the realization of high-quality research to be difficult for them (study 2). These teachers should therefore be better equipped: for the conduct of high-quality practice-based research, for translating their research results into improvements of their own educational practices, and for gaining insight into their own learning and research processes. The instruments developed in study 2 – the coding instrument and rating instrument – can help guide the teacher-researchers with information on, for example, the design and conduct of research and give tips for effective research reporting.

To prevent low quality teacher research in the future, these teacher-researchers should learn to make the research endeavor more visible than is currently the case. This means explaining what they are doing or have done, why they are doing it or have done it and communicating this to others (both to peers as well as interested persons). This should provide not only greater and more comprehensive insight into the ongoing research process, but also help these teachers guide their own research endeavor.

6.5.3 FOR EDUCATIONAL PRACTICE (AND SCHOOL DEVELOPMENT)

A first implication for educational practice stems from our finding that the teacher-researchers participating in our research provided limited insight into the implications of their research outcomes for others, whereby other teachers do not pick up possible improvements (study 2). As a result, desired improvements and changes are often not achieved or stay very close to the practice of the teacher-researchers themselves. In order to realize changed educational practices and school improvements, these teacher-researchers should thus pay more attention to the external validity of their research projects throughout the entire research process. They should spell out the implications of their research results and learn to state what actions need to be taken for their research findings to be implemented and applied in actual practice.

A second implication concerns a greater emphasis of the (student) teachers participating in our research on the improvement of learning and learning results of pupils as a result of their practice-based research. Finally, it should be pupils who need to take advantage of teachers' professional learning and the improvement of educational practice. It seems obvious, but teachers' practice-based research investigating research questions directly related to pupil learning and learning results, has an increased potential for realizing this goal.

6.5.4 FOR TEACHER EDUCATION AND SCHOOLS OF TEACHER EDUCATION

The results of the third study support the claim that PDSs, as supportive environments for practice-based research have added value, at least as far as the perceptions of experienced teachers and student teachers are concerned. Based on our findings we think schools of teacher education should acknowledge the added-value of PDSs and focus on these schools for educating student teachers. The

already realized PDSs with practice-based research as an important feature should make clear how the research of experienced teachers is designed and performed within these schools, how student teachers could join this professional learning activity, and how students' practice-based research is supervised within these schools. Schools of teacher education could then exploit these unique possibilities of PDSs for training student teachers (including their researcher role) and for designing the teacher education curriculum.

Even though a powerful professional learning activity for (student) teachers, both practitioners and researchers of both schools and schools of teacher education still have to invest in realizing this activity in PDSs.

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APPENDICES

A

Appendix 1

Rating system for analyzing the quality of teachers' practice-based research

A. The conceptual phase

Research activity	Standard	Quality criteria (i.e., operationalisation of standard in high-quality practice-based research)
Exploring the research problem	External validity, Acceptance, Legitimacy	Explores the 'occasion' of the research problem (what, why, for whom, when, how manifested, what actions have been taken, effects, etc.)
	Cumulativity	Explores the research problem outside own practice (underpinned by others and/or in literature)
		Judges (gives an opinion) about the (by others) developed knowledge of the research problem)
Defining the research problem	Internal validity	Defines the research problem in a clear problem statement
	Acceptance, Legitimacy	Describes the (practical) relevance of the research problem/research question(s)
Formulating the research question(s)	Internal validity	Defines the research question(s): clear/precise
		Defines the research question(s): functional (answerable through research)
		Defines the research question(s): consistent (research questions are mutually related)(one research question means low score)
		Defines the research question(s): match the outlined research problem
Stating the research purpose	Internal validity	Determines the research purpose
	External validity	Defines the expected outcomes and possible implications for own and/or others' practice
		Describes the research scope (audience, stakeholders, users)
Developing the theoretical framework	Internal validity, Cumulativity	Describes several actual theoretical insights/research findings related to the present research ('last 10 years')
		Describes several relevant theoretical insights/research findings related to the present research
		Describes several high quality theoretical insights/research findings related to the present research
		Integrates the described theoretical insights/research findings (more than just one insight otherwise: no integration)
	Cumulativity	Builds upon or using theoretical insights/research findings from own prior studies or those of other (practitioner) researchers
		Explains the meaning of the theoretical insights/research findings of prior studies for own research

Note: scores: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance), (+) Present and satisfactory (conform standard)

B. The technical phase

Research activity	Standard	Quality criteria (i.e., operationalisation of standard in high-quality practice-based research)
Developing the research design	Accountability, Comprehensibility, Legitimacy	Gives an explicit and transparent overview (schematic or descriptive) of the research design (methodological organization of the research: measurement points, respondent groups, sub studies)
	Internal validity	Justifies the research design with arguments out of the research question(s) (research strategy) and the research purpose (desired results)
Developing the research method(s)	Internal validity, Accountability, Legitimacy, Comprehensibility	Describes research method(s) (illustrated with examples)
		Justifies the developing/choosing process of the research method(s) on basis of research purpose, research question(s) and/or practical circumstances
	Cumulativity	Explores usable (validated and/or standardized) instruments or scales
		Determines utility (or not) of possible instruments and/or scales with arguments
Conducting research (i.e., means of data collection	Internal validity	Provides insight into the reliability and validity of the research method(s) (including improvements made)
		Considers multiple means of dissemination for results about one phenomenon (multiple data sources and/or points of view) (triangulation)
	Accountability, Comprehensibility, Legitimacy	Describes research methods (means of data collection)
Analysing the research data	Internal validity, Accountability, Comprehensibility, Legitimacy	Describing means of data analysis (supported with examples)
	Cumulativity	Explores existing analytic method(s)
		Determines utility (or not) of existing analytic methods with arguments
Interpreting the research results	Comprehensibility	Presents research results in a comprehensible, accessible manner
	Internal validity, Accountability, Legitimacy	Presents research results emerging out of data analysis
		Presents research results matching the formulated research question(s) (no or unclear research question means low score)
Drawing conclusions	Internal validity, Accountability, Legitimacy	Draws conclusions on basis of research data
		Draws conclusions in a way that all research question(s) are covered (no or unclear research question means low score)
		Relates conclusions to several theoretical insights/prior research findings

Note: scores: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance), (+) Present and satisfactory (conform standard)

C. The implemental phase

Research activity	Standard	Quality criteria (i.e., operationalisation of standard in high-quality practice-based research)
Evaluating the research	Learning opportunities, Accountability	Reflects on research process (gives insight into the process and, for example, what went wrong)
Determining implications for own/others' practice	Learning opportunities	Explains implications of research findings for own or others' acting (meaning/sense-making)
Determining implementations for own/others' practice	Learning opportunities, External validity	Explains actions (or considered actions) resulting from the research project for oneself or others
		Makes suggestions how proposed acting can be achieved (by others)
	Learning opportunities	Describes a plan for assessing, reflecting upon and/or studying changed acting on basis of outcomes of research
Making suggestions for future research	Cumulativity	Formulates new and/or follow-up research question(s)

Note: scores: (-) Missing, (+/-) Present but not yet satisfactory (still unclear, missing parts/elements, limited performance), (+) Present and satisfactory (conform standard)

Appendix 2a
The Questionnaire on Teacher Research (QTR)

Translated version (Dutch to English) of the questionnaire.

STATEMENTS ABOUT THE CONTEXTUAL INPUT PART A

In the next section you will find 20 statements about research context. Please indicate your agreement with the given statement.

Not or in a very small extend				In a very high extend
0	0	0	0	0

"(At) our school …"	
1.	I see a willingness to learn among colleagues
2.	There is a budget available for me to perform practice-based research activities
3.	Practice-based research is performed with one or more partners from the partnership (such as other schools, schools of teacher education and/or research institutes)
4.	Practice-based research initiatives of teachers are appreciated by colleagues
5.	Research results are exchanged with one or more partners from the partnership (such as other schools, schools of teacher education and/or research institutes)
6.	There is time available for me to perform practice-based research activities
7.	The school leader subscribes the importance of researching my learning questions as a teacher
8.	Contributes to the partnership
9.	There is a physical room available for performing practice-based research activities
10.	The school leaders shows interest in my practice-based research
11.	It is obvious that teachers perform practice-based research
12.	The importance of practice-based research is recognized
13.	The school leader stimulates me to disseminate the results of my practice-based research within the school (by means of posters, presentations, leaflets, et cetera)
14.	Is respected as a equal partner in the partnership
15.	Results of (own) research are used in discussions about education
16.	I have access to 'resources' (such as literature, magazines) for performing practice-based research
17.	The school leader stimulates me to disseminate the results of my practice-based research outside the school (by means of posters, presentations, leaflets et cetera)
18.	I am informed as a teacher-researcher about (formal) agreements made in the partnership
19.	There is a shared vision on performing practice-based research
20.	There are expert researchers to supervise me with learning to perform practice-based research

STATEMENTS ABOUT THE PERSONAL INPUT

In the next section you will find 5 statements about research motives. Please indicate your agreement with the given statement.

Not or in a very small extend				In a very high extend
0	0	0	0	0

"I perform practice-based research activities because …"

21. I expect to obtain insight into the quality of my own educational practice
22. I want to improve my own acting in the classroom
23. I want to gain insight into pupils' (learning) needs
24. I want to work more evidence-based /make more evidence-based decisions
25. I want to use research results in my own educational practice

STATEMENTS ABOUT THE RESEARCH PROCESS

In the next section you will find 25 statements about the research process. Please indicate your agreement with the given statement.

Not performed at all	Weakly performed	Well performed	Very well performed
0	0	0	0

26. During the preparation of my practice-based research, I have challenged my taken for granted educational practice
27. During the preparation of my practice-based research, I have formulated research questions
28. During the preparation of my practice-based research, I have determined the research purpose(s)
29. During the preparation of my practice-based research, I have formulated the expected outcomes of the research
30. During the preparation of my practice-based research, I have consulted relevant literature
31. During the preparation of my practice-based research, I have made a research design (plan)
32. During the preparation of my practice-based research, I have discussed the content of the research with colleagues
33. While performing the practice-based research, I have made a appraisal of suitable research method(s) for performing the research
34. While performing the practice-based research, I have used different sources for collecting my research data (triangulation)
35. While performing the practice-based research, I have established reliability of the collected research data
36. While performing the practice-based research, I have established validity of the collected research data

37. While performing the practice-based research, I have analyzed the collected research data
38. While performing the practice-based research, I have drawn conclusions based upon the research results
39. While performing the practice-based research, I have discussed with colleagues the way of performing the research
40. When reporting my practice-based research, I have presented research results at meetings within the school (such as conferences, discussions, consultations etcetera)
41. When reporting my practice-based research, I have presented research results outside the own school organization (such as research meetings, conferences, congresses etcetera)
42. When reporting my practice-based research, I have made a report of the practice-based research project (such as a research report, a contribution to the school journal, a leaflet etcetera)
43. When reporting my practice-based research, I have stated how the conclusions can be implemented in practice
44. When reporting my practice-based research, I have proposed questions/issues for further research
45. During the evaluation of my practice-based research, I have looked critically at the contribution of the performed research on the prior objective(s) of the research project
46. During the evaluation of my practice-based research, I have critically looked at the progress of the research process
47. During the evaluation of my practice-based research, I have considered the limitations of the performed research
48. During the evaluation of my practice-based research, I have discussed the possible improvements of the performed research
49. During the evaluation of my practice-based research, I have discussed the conclusions of the research with colleagues
50. During the evaluation of my practice-based research, I have discussed with colleagues how the conclusions of the research can be implemented

STATEMENTS ABOUT THE PERCEIVED (LEARNING) OUTCOMES

In the next section you will find 29 statements about possible (learning) outcomes of practice-based research. Please indicate your agreement with the given statement.

Much smaller/ more badly				Much more/ much better
0	0	0	0	0

"As a result of the performed practice-based research…"

51. I now have a grip on educational innovations
52. I now have insight into the consequences of my actions for the education of pupils
53. I now make my education motivating for pupils
54. I now think about how to apply research results in my own educational practice

55. I now can estimate the quality of performed practice-based research
56. I now take decisions about the interpretation of my own educational practice
57. I now have insight into the (learning) needs of pupils
58. I now feel research is specifically a part of my functioning as a teacher
59. I now feel equipped with regard to my repertoire of action in the classroom
60. I now use my pupils as a source of information for improving my own actions
61. I now have insight into what works in my educational practice
62. I now make my education suitable for pupil learning
63. I am now approaching my own educational practice more research-based
64. I am now focused at improving my education to pupils
65. I am now aware of the relevance of practice-based research
66. I now have skills for discussing practice-based research with colleagues
67. I now feel acknowledged as a educational professional
68. I am now aware of the effectiveness of my own education practice
69. I am now able to support pupils' learning processes
70. I am now interested in the results of practice-based research
71. I now have skills for supervising the practice-based research of others
72. I now reflect on my beliefs concerning good education
73. I now take 'evidence-based' decisions about my own educational practice
74. I now made my education enjoyable for pupils
75. I now enjoy performing practice-based research
76. I now have the capacities to use research results in my own educational practice
77. I now critically assess pursued school policy from the perspective of my own acting
78. I am now able to create powerful learning environments for pupils
79. I now know how to interest pupils for my teaching topic

Appendix 2a

The Questionnaire on Teacher Research (QTR) (Dutch version)

STELLINGEN MET BETREKKING TOT DE ONDERZOEKSCONTEXT

Geef voor de volgende stellingen aan in welke mate ze volgens u van toepassing zijn op uw school

Niet of in zeer geringe mate				In zeer hoge mate
0	0	0	0	0

"Bij ons op school…/ Onze school …"

1. Zie ik bij collega's een bereidheid om te leren
2. Is er voor mij budget beschikbaar om mijn praktijkonderzoek uit te voeren
3. Wordt praktijkonderzoek samen met een of meerdere partners uit het partnerschap uitgevoerd (zoals andere scholen, opleiding- en/of onderzoeksinstituten)
4. Worden initiatieven van docenten om praktijkonderzoek te doen gewaardeerd door collega's
5. Worden onderzoeksresultaten uitgewisseld met een of meerdere partners uit het partnerschap (zoals andere scholen, opleiding- en/of onderzoeksinstituten)
6. Zijn er (taak)uren beschikbaar om mijn praktijkonderzoek uit te voeren
7. Vindt de schoolleiding het belangrijk dat het praktijkonderzoek aansluit bij mijn leervragen als docent
8. Heeft inbreng in het partnerschap
9. Is er een fysieke ruimte beschikbaar voor de uitvoering van mijn praktijkonderzoek
10. Toont de schoolleiding interesse in mijn praktijkonderzoek
11. Is het vanzelfsprekend dat docenten praktijkonderzoek doen
12. Wordt het belang van praktijkonderzoek onderkend
13. Spoort de schoolleiding mij aan om de resultaten van mijn praktijkonderzoek te verspreiden binnen de school (door middel van posters, presentaties, folders, et. cetera)
14. Wordt als een gelijkwaardige partner in het partnerschap gerespecteerd
15. Worden bij discussies over onderwijs resultaten van eigen onderzoek gebruikt
16. Heb ik toegang tot 'bronnen' (als literatuur, tijdschriften) voor het doen van praktijkonderzoek
17. Spoort de schoolleiding mij aan om de resultaten van mijn praktijkonderzoek te verspreiden buiten de school (door middel van posters, presentaties, folders et. cetera)
18. Wordt ik als docentonderzoeker op de hoogte gebracht van de gemaakte (formele) afspraken in het partnerschap
19. Is er sprake van een gedeelde visie op het doen van praktijkonderzoek
20. Zijn er deskundige begeleiders aangetrokken om mij te ondersteunen bij het leren onderzoek van de eigen praktijk

STELLINGEN MET BETREKKING TOT DE PERSOONLIJKE MOTIVATIE

Geef voor de onderstaande stellingen aan in welke mate ze op u van toepassing zijn

Niet of in zeer geringe mate				In zeer hoge mate
0	0	0	0	0

"Ik voer praktijkonderzoek uit omdat …"

21. Ik verwacht meer inzicht te verkrijgen in de kwaliteit van mijn eigen onderwijs
22. Ik mijn eigen handelen in de klas wil verbeteren
23. Ik meer inzicht wil verkrijgen in de (leer) behoeften van leerlingen
24. Ik op een meer onderzoeksmatige wijze te werk wil gaan
25. Ik de resultaten van praktijkonderzoek in mijn eigen onderwijs wil gebruiken

STELLINGEN MET BETREKKING TOT HET ONDERZOEKSPROCES

In dit gedeelte van de vragenlijst krijgt u een aantal stellingen met mogelijke onderzoeksactiviteiten. Geef voor deze onderzoeksactiviteiten aan of u ze heeft uitgevoerd (ja/nee) en indien u ze heeft uitgevoerd, hoe tevreden u over deze uitvoering bent.

Nee	Ja, en het ging matig	Ja, en het ging redelijk	Ja, en het ging goed
0	0	0	0

26. Bij het voorbereiden van mijn praktijkonderzoek heb ik vanzelfsprekendheden in mijn eigen onderwijspraktijk ter discussie gesteld
27. Bij het voorbereiden van mijn praktijkonderzoek heb ik onderzoeksvragen geformuleerd
28. Bij het voorbereiden van mijn praktijkonderzoek heb ik de doelstelling(en) van het praktijkonderzoek bepaald
29. Bij het voorbereiden van mijn praktijkonderzoek heb ik de verwachte opbrengsten van het praktijkonderzoek geformuleerd
30. Bij het voorbereiden van mijn praktijkonderzoek heb ik literatuur geraadpleegd
31. Bij het voorbereiden van mijn praktijkonderzoek heb ik een onderzoeksopzet (plan) gemaakt
32. Bij het voorbereiden van mijn praktijkonderzoek heb ik met collega's discussies gevoerd over de inhoud van het praktijkonderzoek
33. Bij het uitvoeren van mijn praktijkonderzoek heb ik een afweging gemaakt welke onderzoeksmethode(n) het meest geschikt was/waren voor de uitvoering van mijn praktijkonderzoek
34. Bij het uitvoeren van mijn praktijkonderzoek heb ik gebruik gemaakt van verschillende bronnen voor het verzamelen van mijn onderzoeksgegevens (triangulatie)
35. Bij het uitvoeren van mijn praktijkonderzoek ben ik nagegaan of de door mij verzamelde onderzoeksgegevens betrouwbaar waren
36. Bij het uitvoeren van mijn praktijkonderzoek ben ik nagegaan of de door mij gebruikte onderzoeksmethode de onderzoeksgegevens opleverde die ik wilde (validiteit)

37. Bij het uitvoeren van mijn praktijkonderzoek heb ik de verzamelde onderzoeksgegevens geanalyseerd
38. Bij het uitvoeren van mijn praktijkonderzoek heb ik conclusies getrokken op grond van de onderzoeksresultaten
39. Bij het uitvoeren van mijn praktijkonderzoek heb ik samen met collega's discussies gevoerd over de uitvoering van het praktijkonderzoek
40. Bij het rapporteren van mijn praktijkonderzoek heb ik onderzoeksresultaten gepresenteerd op bijeenkomsten binnen de school (zoals vergaderingen, besprekingen, overleggen et. cetera)
41. Bij het rapporteren van mijn praktijkonderzoek heb ik onderzoeksresultaten gepresenteerd op bovenschoolse bijeenkomsten (zoals onderzoeksbijeenkomsten, conferenties, congressen et. cetera)
42. Bij het rapporteren van mijn praktijkonderzoek heb ik een rapportage geschreven over het praktijkonderzoek (zoals een onderzoeksverslag, een bijdrage aan het schoolblad, folder et. cetera)
43. Bij het rapporteren van mijn praktijkonderzoek heb ik aangegeven hoe de conclusies in de praktijk geïmplementeerd kunnen worden
44. Bij het rapporteren van mijn praktijkonderzoek heb ik voorstellen gedaan voor verder onderzoek
45. Bij het evalueren van mijn praktijkonderzoek heb ik kritisch gekeken of het uitgevoerde praktijkonderzoek heeft bijgedragen aan de doelstelling(en) van het project
46. Bij het evalueren van mijn praktijkonderzoek heb ik kritisch gekeken naar het verloop van mijn onderzoeksproces
47. Bij het evalueren van mijn praktijkonderzoek heb ik nagedacht over de beperkingen van het door mij uitgevoerde praktijkonderzoek
48. Bij het evalueren van mijn praktijkonderzoek heb ik met collega's gesproken over mogelijke verbeteringen aan het door mij uitgevoerde praktijkonderzoek
49. Bij het evalueren van mijn praktijkonderzoek heb ik samen met collega's de conclusies van het praktijkonderzoek bediscussieerd
50. Bij het evalueren van mijn praktijkonderzoek heb ik samen met collega's besproken hoe we de conclusies van het praktijkonderzoek in de onderwijspraktijk kunnen implementeren

STELLINGEN MET BETREKKING TOT GEPERCIPIEERDE (LEER) OPBRENGSTEN

De onderstaande stellingen geven mogelijke opbrengsten aan als gevolg van het door u uitgevoerde praktijkonderzoek. Geef voor deze stellingen aan in hoeverre ze *op dit moment* voor u van toepassing zijn – *in tegenstelling tot de situatie voordat u praktijkonderzoek uitvoerde*.

Veel minder /slechter				Veel meer /beter
0	0	0	0	0

"Als gevolg van het door mij uitgevoerde praktijkonderzoek…"

51. Heb ik nu grip op veranderingen in het onderwijs
52. Heb ik nu inzicht in de gevolgen van mijn handelen voor het onderwijs aan leerlingen
53. Heb ik mijn onderwijs motiverend gemaakt voor leerlingen

54. Denk ik nu na over hoe ik onderzoeksresultaten kan toepassen in mijn eigen onderwijspraktijk
55. Kan ik nu de kwaliteit van uitgevoerd praktijkonderzoek inschatten
56. Neem ik nu beslissingen over de invulling van mijn eigen onderwijspraktijk
57. Heb ik nu inzicht in de (leer)behoeften van leerlingen
58. Is onderzoek nu specifiek deel uit gaan maken van mijn functioneren als docent
59. Voel ik me nu toegerust met betrekking tot mijn handelingsrepertoire in de klas
60. Gebruik ik nu mijn leerlingen als informatiebron voor het verbeteren van mijn handelen
61. Heb ik nu inzicht in wat werkt in mijn onderwijspraktijk
62. Heb ik mijn onderwijs geschikt gemaakt voor het leren van leerlingen
63. Ben ik nu op een meer onderzoeksmatige manier bezig met mijn eigen onderwijs
64. Ben ik nu gericht op het verbeteren van mijn onderwijs aan leerlingen
65. Ben ik me nu bewust van de relevantie van praktijkonderzoek
66. Ben ik nu vaardig in het bediscussiëren van praktijkonderzoek met collega's
67. Voel ik me nu serieus genomen als onderwijsprofessional
68. Ben ik me nu bewust van de effectiviteit van mijn eigen onderwijs
69. Ben ik nu in staat leerlingen te ondersteunen in hun leerproces
70. Ben ik nu geïnteresseerd in de resultaten van praktijkonderzoek
71. Ben ik nu vaardig in het begeleiden van anderen bij hun praktijkonderzoek
72. Reflecteer ik nu op mijn eigen opvattingen over goed onderwijs
73. Neem ik nu 'evidence-based' beslissingen over mijn eigen onderwijs
74. Heb ik mijn onderwijs plezierig gemaakt voor leerlingen
75. Heb ik nu plezier in het uitvoeren van praktijkonderzoek
76. Bezit ik nu capaciteiten om onderzoeksresultaten te gebruiken in mijn eigen onderwijspraktijk
77. Stel ik me nu kritisch op ten aanzien van het gevoerde schoolbeleid in relatie tot mijn handelen
78. Ben ik nu in staat krachtiger leeromgevingen voor leerlingen te creëren
79. Weet ik leerlingen nu door mijn onderwijs te interesseren voor mijn vak

SUMMARY

RESEARCHING THE TEACHER-RESEARCHER: PRACTICE-BASED RESEARCH IN DUTCH PROFESSIONAL DEVELOPMENT SCHOOLS

TEACHER PROFESSIONAL DEVELOPMENT THROUGH PRACTICE-BASED RESEARCH

Recent findings of research on teacher learning indicate that continuous professional development of (student) teachers is crucial for improving the quality of education (Darling-Hammond, 2006, 2010; Fullan, 2007). In-school practice-based research through teachers-as-researchers has recently been put forth by researchers, teacher educators and policy makers as a potentially effective learning strategy for such continuous professional development of teachers (Burton & Bartlett, 2005; Loughran, 2002; Zeichner & Noffke, 2001). It is expected that through conducting practice-based research activities, teachers acquire deep knowledge about the causes and consequences of their actions, find answers to specific practical problems and questions, and provide evidence of what works in practice and why. The expectation is that as a result of teachers' professional growth, pupils' learning and learning results improve (Teitel, 2001, 2003).

Particularly in so-called *professional development schools* ('PDSs'), teachers are encouraged to develop a research role in addition to their teaching role (Darling-Hammond, 2005). In the Netherlands, similar to other Western countries, efforts have been undertaken to establish and maintain supportive research environments for teacher-researchers at these PDSs. Following Darling-Hammond (2005) the aim of these PDSs is to create a rich research environment in which on the one hand the learning of student teachers (including the teacher-researcher role) is supported by settings in which they enter professional practice by working with expert practitioners, and on the other hand experienced teachers are stimulated to develop themselves professionally via the conduct of practice-based research. In the Netherlands, as elsewhere in the world, PDSs work together in partnerships with schools of primary or secondary education and institutes of teacher education.

Despite the aforementioned benefits and developments, empirical support for the assumptions that (student) teachers' research motives play an important role in performing in-school practice-based research activities, that as a result of these practice-based research activities (student) teachers learn professionally, that PDSs

are a supportive context for this learning, and that pupils' learning and learning results improve as a result of this, is still scarce.

In this dissertation, we wanted to provide empirical evidence for the proposition that performing practice-based research in PDSs is a powerful incentive for the professional development of (student) teachers. Therefore, the aims of this dissertation were:

1. Mapping the concepts associated with (student) teachers' practice-based research in schools in terms of research input, research process, and research outcomes. More specifically the following aspects were investigated: (a) *contextual input,* or the realization of research environments in schools, (b) *personal input,* or teachers' and student teachers' motives for performing practice-based research, (c) the research *process,* or the performed practice-based research activities by teachers and student teachers, and (d) research *outcomes,* or the perceived outcomes regarding research and teaching following practice-based research.

2. Investigating the added-value of PDSs settings compared with non-PDSs settings. More specifically, PDSs and non-PDSs (student) teachers' perceptions of the aforementioned aspects associated with practice-based research were compared.

3. Testing a hypothetical model that describes the relations between (student) teachers' perceptions of the input (contextual and personal), process and outcomes of practice-based research, and with that, the relative importance of these different aspects in relation to each other.

To meet these aims, four studies were conducted for these purposes using both qualitative and quantitative research methods. The following four key questions were addressed:

1. What are participants' – school leaders', teachers' and student teachers' – perceptions of the actual and preferred situation regarding practice-based research in Dutch PDSs?

2. What features characterize teachers' practice-based research activities and what is the impact of these activities in terms of quality standards and criteria, and learning outcomes?

3. Do PDSs make a difference in terms of (student) teachers' perceptions of input (contextual and personal), process and outcomes of in-school practice-based research?

4. What model explains the empirical relations that exist in (student) teachers' perceptions of factors associated with the input (contextual and personal), process and outcomes of in-school practice-based research?

PARTICIPANTS' PERCEPTIONS OF PRACTICE-BASED RESEARCH IN SCHOOLS

In *Chapter Two* a study on participants' (e.g., school principals', teachers' and student teachers') perceptions of the context, process and outcomes of practice-based research in Dutch PDSs was described. In this study, eight school principals, ten teachers and six student teachers (N=24) from four PDSs in the Netherlands were asked for their perceptions by means of a semi-structured interview. During the interviews, respondents were asked for their perception of the actual and preferred situation regarding teachers' practice-based research in PDSs. Through investigating participants' perceptions, we have gathered important information about how participants' perceive the actual realization of the context, process and outcomes of practice-based research in their PDSs and how they ideally would like to see this.

Important results were (1) a large difference in all participants' perceptions between the perceived actual and preferred situation in terms of context, process and outcomes of practice-based research, (2) differences in participants' perceptions regarding the preferred features of teacher research, (3) a strong attention by respondents for the conditions for teacher research in schools when compared to the other aspects investigated, (4) the awareness by participants of the complexity of realizing a partnership between different partners involved in the PDSs, and (5) the importance that respondents attach to accomplishing a 'research oriented culture' at all levels of the school, including pupils.

QUALITY AND IMPACT OF PRACTICE-BASED RESEARCH BY TEACHERS IN PDSS

Chapter Three reported on an in-depth case study, in which the impact of six teacher-researchers' practice-based research projects in two PDSs was investigated. The characteristics of the practice-based research projects, teachers' research performance as perceptible in their research reports (i.e. the quality of teachers' research activities) and their perceived (learning) outcomes as a result of their practice-based research projects, were the focus of this study. Three research instruments were developed to investigated these elements: a coding scheme for investigating practice-based research' characteristics, a rating instrument with research standards for rating the quality of teachers' research performance, and a coding scheme for investigating teachers' perceived professional growth.

Based on the results, two conclusions can be drawn with regard to the characteristics of the teachers' practice-based research projects. First, the context and content characteristics of the six practice-based research projects showed projects that were clearly embedded in the teachers' own educational practices and these projects thus started from the teachers' own research questions to bring about perceptible improvements, such as changed procedures, materials or didactics. Second, the discourse characteristics of the teachers' practice-based research projects differed considerably. With respect to the quality of the practice-based research conducted by the teachers, their research reports showed this to be frequently less than satisfactory (i.e. research activities as for example formulating research questions were not up to an acceptable quality standard). With respect to teachers' perceived learning outcomes, the interviews showed the different perceived learning outcomes to remain most times close to the teachers themselves.

COMPARING BETWEEN PDSS AND NON-PDSS

In *Chapter Four*, teacher-researchers' and researching student teachers' perceptions of practice-based research were compared for PDS and non-PDS settings. Based upon research findings of the two prior studies, a questionnaire, the Questionnaire on Teacher Research (QTR), was developed. Analyses showed the QTR to be a useful, reliable and valid tool for assessing teachers' perceptions of their research efforts. By means of this questionnaire, respondents (N=102) were asked for their perceptions regarding (a) the research environment in their schools (including the partnership), (b) their motives for conducting practice-based research, (c) the research process itself (the conducted research activities and respondents' satisfaction with the performed activities), and (d) their perceived professional growth with respect to their researching role and their teaching role.

Based upon the results we can draw two important conclusions. First, the aspects 'research motives' and both 'outcomes of practice-based research' were rated highest by respondents suggesting that they perceive those aspects most positive. The average scores for the three contextual input scales were lower, and scores for the two research process scales the lowest. Second, the results showed PDS teachers scoring higher for all eight QTR-scales compared to non-PDS teachers. Differences between PDSs and non-PDSs were large and statistically significant for partnership, research infrastructure and for teachers' research attitudes and efficacy beliefs. Furthermore, the results also showed statistically significant, but somewhat smaller differences between PDSs and non-PDSs for research culture and for evaluating and reporting research. After taking into account teacher experience,

differences remained. Only the difference for teachers' research attitudes and efficacy beliefs became less strong and a new, statistically significant difference for planning and executing research emerged. So, the teaching experience of the respondents hardly affected differences in perceptions between PDSs and non-PDSs. Based on these results it can be concluded that, in terms of teachers' perceptions, PDSs do matter and that teachers perceive such schools as more positive environments for research.

TESTING A MODEL FOR TEACHERS' PRACTICE-BASED RESEARCH IN SCHOOLS

Chapter Five described the investigation of structural paths (relations) between respondents' perceptions of contextual input variables (structure, culture, and partnership), a personal input variable (research motivation), process variables (planning and performing research, and evaluating and reporting research) and outcome variables (outcomes regarding 'teaching', and outcomes regarding 'researching') of practice-based research in secondary education schools, by means of structural equation modeling. In the study, 56 teacher-researchers and student-teachers who carried out practice-based research were asked for their perceptions by means of the Questionnaire on Teacher Research (QTR). Based upon the findings we could build an empirical structural model fitting the data well, with direct and indirect paths between associated variables of practice-based research. More insight was obtained into what (student) teachers themselves think about which concepts are important with respect to practice-based research outcomes in secondary education schools. Based upon the findings of this study we can draw three main conclusions.

First, the contextual input variables mainly had indirect relationships with process and outcome variables. Only research infrastructure had a direct influence on the process variable 'evaluating and reporting research. Based upon this finding we can draw the conclusion that the contextual variables seemed not that important in explaining teachers' perceptions of the practice-based research process and research outcomes as our first two studies seemed to suggest. Second, both process variables did have an important influence on outcome variables. Both process variables directly influenced the outcome variable 'research attitude and efficacy beliefs', the planning and performing research variable also indirectly. Both process variables indirectly influenced teacher efficacy, via the mediating variable research attitude and efficacy beliefs. Third, research motives had a direct influence on both outcome variables. Certainly with respect to 'research attitude and efficacy beliefs' the research motives variable had a clear direct influence. This influence was up to twice as strong as the influence of the process variables on research attitude and

efficacy beliefs. Based upon this finding we can draw the conclusion that besides the process variables research motives are also very important for obtaining both outcomes.

CONCLUSIONS AND IMPLICATIONS

in *Chapter Six*, the results of the four studies were summarized for each of the research questions, followed by a general discussion of the main findings, including theoretical and practical implications that can be derived from the findings, some limitations of the study and suggestions for future research.

Across the four studies, three important conclusions can be drawn with respect to the realization of (student) teachers' practice-based research in secondary education schools, and PDSs in particular. First, it was found that teachers and schools when realizing practice-based research, particularly focus on the realization of a research environment in their school organization (i.e. conditions for performing in-school practice-based research). Second, performing practice-based research in schools appeared not to be an easy process for (student) teachers. Third, from the outcomes of the different studies it could be concluded that (student) teachers perceived different (learning) outcomes of their practice-based research, both with respect to performing practice based research as well as with respect to their teaching. Based on the results, it can also be concluded that in terms of (student) teachers' perceptions, PDSs do matter. The (student) teachers investigated in our study perceived such schools as more positive environments for performing practice-based research. PDSs seemed to have more favorable conditions for performing practice-based research compared with non-PDSs. Schools of teacher education should acknowledge the added-value of PDSs and focus on these schools for educating student teachers. Even though a powerful professional learning activity for (student) teachers, both practitioners and researchers of both schools and schools for teacher education still have to invest in realizing this activity in PDSs.

Schools that wish to implement practice-based research as a professional learning activity should focus on teachers' and student teachers' motives for performing practice-based research and the practice-based research process itself, instead of investing in and focusing too much on the context for practice-based research in schools. Also the topics of research should be close to the practice of the teacher-researcher themselves.

Looking at the quality of teachers' practice-based research in PDSs, this did not yet meet the criteria. Schools should show teacher-researchers how good practices are

established. Teachers should therefore be better equipped: for the conduct of high-quality practice-based research, for translating their research results into improvements of their own educational practices, and for gaining insight into their own learning and research processes. To prevent low quality teacher research in the future, teacher-researchers should also learn to make the research endeavor more visible than is currently the case.

Also with respect to the outcomes of teachers' practice-based research projects, there appeared considerable room for improvement. In order to realize changed educational practices and school improvements, teacher-researchers should pay more attention to the external validity of their research projects throughout the entire research process. They should spell out the implications of their research results and learn to state what actions need to be taken for their research findings to be implemented and applied in actual practice. Last, a greater emphasis on the improvement of learning and learning results of pupils as a result of (student) teachers' practice-based research would be necessary.

SAMENVATTING (SUMMARY IN DUTCH)

DE DOCENTONDERZOEKER ONDERZOCHT: PRAKTIJKGERICHT ONDERZOEK IN NEDERLANDSE OPLEIDINGSSCHOLEN

PROFESSIONELE ONTWIKKELING DOOR PRAKTIJKGERICHT ONDERZOEK

Onderzoeksresultaten laten zien dat continue professionele ontwikkeling van docenten en docenten-in-opleiding van cruciaal belang is voor de verbetering van de kwaliteit van het onderwijs (Darling-Hammond, 2006, 2010; Fullan, 2007). Onderzoekers, opleiders en beleidsmakers propageren praktijkgericht onderzoek in scholen uitgevoerd door docentonderzoekers als een potentieel effectieve strategie voor een dergelijke continue professionele ontwikkeling van docenten (Burton & Bartlett, 2005; Loughran, 2002; Zeichner & Noffke, 2001). Men verwacht dat docenten door het uitvoeren van praktijkgerichte onderzoeksactiviteiten, kennis ontwikkelen over de oorzaken en gevolgen van hun handelen, antwoorden vinden op specifieke praktijkvragen en problemen en bewijs vinden voor wat in de praktijk werkt en waarom. De verwachting is dat als gevolg van de professionele ontwikkeling van docenten, het leren van leerlingen en hun leerresultaten verbeteren (Teitel, 2001, 2003).

Met name in de zogenaamde '*Professional Development Schools'* ('PDSs') of in het Nederlands 'Opleidingsscholen', worden leraren aangemoedigd om naast hun onderwijzende rol een onderzoekende rol op zich te nemen en eigen te maken (Darling-Hammond, 2005). In Nederland, net als elders in de wereld, werken deze Opleidingsscholen samen in partnerschappen met scholen voor primair of secundair onderwijs en lerarenopleidingen. Volgens Darling-Hammond (2005) is het doel van Opleidingsscholen het creëren van een rijke leeromgeving waarin zowel het leren van aanstaande docenten (met inbegrip van de rol van de docentonderzoeker) wordt ondersteund, als ook ervaren docenten gestimuleerd worden zich via praktijkgericht onderzoek professioneel verder te ontwikkelen.

Omdat de empirische ondersteuning voor de veronderstelling dat het uitvoeren van praktijkgericht onderzoek een krachtig middel is voor de professionele ontwikkeling van (aanstaande) docenten en de onderzoek ondersteunende en stimulerende context van Nederlandse Opleidingsscholen schaars is, wordt in dit proefschrift

gezocht naar empirische ondersteuning voor deze veronderstelling. De doelstellingen van dit proefschrift zijn:

1. Het onderzoeken van de concepten gerelateerd aan het praktijkgericht onderzoek van docenten in scholen in termen van: de input in het onderzoek, het onderzoeksproces en de onderzoeksresultaten. Meer in het bijzonder werden de volgende aspecten onderzocht: (a) de *contextuele input,* ofwel de realisatie van onderzoek omgevingen in scholen, (b) de *persoonlijke input,* ofwel de motieven van docenten (in-opleiding) voor het uitvoeren van praktijkgericht onderzoek, (c) het *onderzoeksproces,* ofwel de praktijkgerichte onderzoeksactiviteiten uitgevoerd door docenten (in-opleiding), en (d) *onderzoeksresultaten,* ofwel de gepercipieerde resultaten als gevolg van het uitgevoerde praktijkgerichte onderzoek.

2. Het onderzoeken van de toegevoegde waarde van Nederlandse Opleidingsscholen in vergelijking met niet-Opleidingscholen. Meer in het bijzonder, werden de percepties van docenten (in-opleiding) van Opleidingsscholen en niet-Opleidingsscholen ten aanzien van de bovengenoemde aspecten van praktijkgericht onderzoek vergeleken.

3. Het toetsen van een door ons ontwikkeld hypothetisch model waarin de relaties tussen de percepties van docenten (in-opleiding) met betrekking tot de input (contextueel en persoonlijk), het proces en de resultaten van het praktijkgericht onderzoek, alsook het relatieve belang van deze verschillende aspecten ten opzichte van elkaar, zijn weergegeven.

Om deze doelstellingen te bereiken, werden vier studies uitgevoerd met behulp van zowel kwalitatieve als kwantitatieve onderzoeksmethoden. De volgende vier hoofdvragen stonden centraal in het onderzoek:

1. Wat zijn de percepties van betrokken participanten – schoolleiders, docenten en docenten-in-opleiding – van de werkelijke en de gewenste situatie met betrekking tot praktijkgericht onderzoek in Nederlandse Opleidingsscholen?

2. Welke eigenschappen karakteriseren de praktijkgerichte onderzoeksactiviteiten van docentonderzoekers in Nederlandse Opleidingsscholen en wat is de impact van deze activiteiten in termen van leerresultaten, kwaliteitsnormen en criteria?

3. Maken Nederlandse Opleidingsscholen een verschil in de percepties van docenten (in-opleiding) met betrekking tot de input (contextueel en persoonlijk), het proces en de resultaten van praktijkgericht onderzoek in scholen?

4. Welk model verklaart de empirische relaties die bestaan in de percepties van docenten (in-opleiding) met betrekking tot de input (contextueel en persoonlijk), het proces en de resultaten van praktijkgericht onderzoek in scholen?

PERCEPTIES VAN PRAKTIJKGERICHT ONDERZOEK IN OPLEIDINGSSCHOLEN

Hoofdstuk twee beschrijft een studie naar de percepties van betrokken deelnemers (schoolleiders, docenten en docenten-in-opleiding) met betrekking tot de context, het proces en de resultaten van praktijkgericht onderzoek in Nederlandse Opleidingsscholen. In deze studie, werden acht schoolleiders, tien docenten en zes docenten-in-opleiding (N = 24) van vier Opleidingsscholen in Nederland door middel van een semigestructureerd interview gevraagd naar hun percepties. Tijdens de interviews werden respondenten gevraagd voor hun perceptie van de werkelijke en de gewenste situatie met betrekking tot praktijkgericht onderzoek door docenten (in-opleiding) in Opleidingsscholen. Door middel van deze studie naar de percepties van deelnemers, hebben we informatie verzameld over hoe de deelnemers de daadwerkelijke realisatie van de context, het proces en de resultaten van het praktijkgericht onderzoek in hun Opleidingsscholen waarnemen en hoe ze dit idealiter zouden willen zien.

De belangrijkste resultaten waren: (1) een groot verschil in de percepties van alle deelnemers tussen de waargenomen werkelijke situatie en de geprefereerde situatie met betrekking tot de context, het proces en de resultaten van het praktijkgerichte onderzoek, (2) verschillen in de percepties van de deelnemers over de gewenste kenmerken van het praktijkgerichte onderzoek van docentonderzoekers, (3) sterke aandacht voor de randvoorwaarden (context) voor praktijkgericht onderzoek in scholen in vergelijk met de andere onderzochte aspecten, (4) het bewustzijn van de deelnemers van de complexiteit van het realiseren van een partnerschap tussen verschillende partners betrokken bij de Opleidingsschool, en (5) het belang dat respondenten hechten aan de totstandbrenging van een op 'onderzoek georiënteerde cultuur' op alle niveaus van de schoolorganisatie, met inbegrip van het stimuleren van een onderzoekende houding bij leerlingen.

KWALITEIT EN IMPACT VAN PRAKTIJKGERICHT ONDERZOEK

In *Hoofdstuk drie* wordt een verdiepende casestudy gerapporteerd waarin de impact van zes praktijkgerichte onderzoeken van zes docentonderzoekers in twee Opleidingsscholen werd onderzocht. De focus van deze studie zijn de kenmerken van de praktijkgerichte onderzoeksprojecten, de waarneembare kwaliteit van de

door de docenten uitgevoerde praktijkgerichte onderzoeksactiviteiten en de gepercipieerde (leer)resultaten als gevolg van deze onderzoeksactiviteiten. Drie onderzoeksinstrumenten werden ontwikkeld om deze elementen te onderzoeken: een coderingsschema gebaseerd op een literatuurreview voor de kenmerken van het praktijkgerichte onderzoek, een ratinginstrument voor het beoordelen van de kwaliteit van de praktijkgerichte onderzoeksactiviteiten, en een coderings-instrument voor het onderzoeken van de door de docentonderzoekers ervaren professionele groei.

Op basis van de resultaten, kunnen twee conclusies worden getrokken met betrekking tot de kenmerken van het praktijkgerichte onderzoek van docenten. Ten eerste blijkt met betrekking tot de context en de inhoud van de zes praktijkgerichte onderzoeksprojecten dat de projecten die duidelijk voortkomen uit de eigen onderwijspraktijk en dus onderzoeksvragen behandelen van docentonderzoekers zelf, daadwerkelijk leidden tot merkbare verbeteringen, zoals gewijzigde procedures, materialen of didactiek. Ten tweede kunnen we met betrekking tot het discours kenmerk concluderen dat de zes praktijkgerichte onderzoeksprojecten aanzienlijk verschillen (bijvoorbeeld ten aanzien van peer review en het geven van feedback). Met betrekking tot de kwaliteit van de uitgevoerde praktijkgerichte onderzoeken, bleek uit de onderzoeksrapportages dat de zes onderzoeken matig voldeden aan de door ons ontwikkelde kwaliteit standaard. Met betrekking tot de door de docentonderzoekers gepercipieerde (leer)resultaten bleek uit de interviews dat de verschillende waargenomen (leer)resultaten dicht bij de docenten zelf bleven zoals bijvoorbeeld vergroot bewustzijn van het eigen handelen en veel minder vaak ook anderen betrof zoals collega's en leerlingen.

OPLEIDINGSSCHOLEN EN NIET-OPLEIDINGSSCHOLEN VERGELEKEN

In *Hoofdstuk 4* wordt studie 3 gerapporteerd. Op basis van de onderzoeksresultaten van studie 1 en 2 werd de vragenlijst 'Questionnaire on Teacher Research' (QTR), ontwikkeld. Door middel van deze vragenlijst werden respondenten (docenten en docenten-in-opleiding, N = 102) die werkzaam zijn aan Opleidingsscholen en niet-Opleidingsscholen gevraagd naar hun perceptie met betrekking tot (a) de onderzoeksomgeving in hun scholen (met inbegrip van het partnerschap), (b) hun motieven voor het uitvoeren van praktijkgericht onderzoek, (c) het onderzoeksproces zelf (de uitgevoerde onderzoeksactiviteiten en de tevredenheid van respondenten over de uitgevoerde activiteiten), en (d) hun vermeende professionele groei met betrekking tot de onderzoeksrol en docentrol.

Analyses van de data laten op de eerste plaats zien dat de validiteit en de betrouwbaarheid van de vragenlijst voor het onderzoeken van de percepties van docenten (in-opleiding) met betrekking tot praktijkgericht onderzoek in scholen, goed is. Op basis van de resultaten kunnen we twee belangrijke conclusies trekken. Ten eerste kunnen we concluderen dat de aspecten 'onderzoeksmotivatie' en de twee resultaat aspecten ('onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek' en effectiviteitovertuiging t.a.v. doceren') het meest positief gepercipieerd worden door respondenten. De gemiddelde scores voor de drie contextuele input schalen lagen lager dan bovenstaande aspecten en de scores voor de twee proces aspecten werden het laagst (minst positief) gepercipieerd. Ten tweede blijkt dat de docenten (in-opleiding) van de Opleidingsscholen ten aanzien van alle schalen van de vragenlijst hoger scoren dan docenten (in-opleiding) van de niet-Opleidingsscholen. Tussen Opleidingsscholen en niet-opleidingsscholen vonden we grote statistisch significante verschillen voor de aspecten 'partnerschap', 'onderzoeksinfrastructuur' en voor 'onderzoekende houding en effectiviteit-overtuiging t.a.v. onderzoek'. Bovendien toonden de resultaten ook statisch significante, maar iets kleinere verschillen aan tussen Opleidingsscholen en niet-opleidingsscholen voor 'onderzoekscultuur' en voor 'evaluatie en rapportage van praktijkgericht onderzoek'. Ook na correctie van de factor 'onderwijservaring' bleven deze verschillen bestaan. Alleen het verschil voor 'onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek' werd minder sterk en een nieuw, statistisch significant verschil ontstond voor het aspect 'planning en uitvoering van praktijkgericht onderzoek'. De conclusie is, dat de onderwijservaring van de respondenten nauwelijks de verschillen in opvattingen met betrekking tot praktijkgericht onderzoek tussen Opleidingsscholen en niet-opleidingsscholen beïnvloedt. Op basis van deze resultaten kan worden geconcludeerd dat, in termen van de percepties van docenten (in-opleiding), Opleidingsscholen er toe doen en dat docenten (in-opleiding) in dergelijke scholen een meer positieve omgeving voor praktijkgericht onderzoek waarnemen.

TESTEN VAN EEN MODEL VOOR PRAKTIJKGERICHT ONDERZOEK IN SCHOLEN

In *Hoofdstuk vijf* wordt de vierde studie beschreven naar de structurele relaties (paden) tussen de percepties van respondenten met betrekking tot de contextuele input variabelen (onderzoeksinfrastructuur, onderzoekscultuur en partnerschap), een persoonlijke input variabele (onderzoeksmotivatie), procesvariabelen ('planning en uitvoering van praktijkgericht onderzoek' en 'evaluatie en rapportage van praktijkgericht onderzoek') en de resultaat variabelen ('onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek' en 'effectiviteitovertuiging t.a.v. doceren')

van praktijkgericht onderzoek. In de studie werden 56 docentonderzoekers en docenten-in-opleiding die praktijkgericht onderzoek verrichten door middel van de 'Questionnaire on Teacher Research' gevraagd naar hun percepties. Gebaseerd op de bevindingen hebben we een goed bij de onderzoeksdata passend empirisch structureel model kunnen samenstellen met directe en indirecte paden tussen de verschillende aspecten (variabelen) van praktijkgericht onderzoek. Hierdoor hebben we meer inzicht verkregen in welke concepten docenten (in-opleiding) zelf belangrijk vinden met betrekking tot het praktijkgericht onderzoek in scholen.

Op basis van de onderzoeksresultaten van deze studie kunnen wij drie belangrijke conclusies trekken. Ten eerste kunnen we concluderen dat er voornamelijk indirecte relaties bestaan tussen de contextuele input variabelen en de proces en resultaat variabelen. Alleen de variabele onderzoeksinfrastructuur heeft een directe invloed op de procesvariabele 'evaluatie en rapportage van praktijkgericht onderzoek'. Op basis van deze bevinding kunnen wij concluderen dat de contextuele variabelen niet zo belangrijk lijken te zijn in het verklaren van de percepties van docenten (in-opleiding) met betrekking tot het praktijkgerichte onderzoeksproces en onderzoeksresultaten, als onze eerste twee studies leken te suggereren. Ten tweede kunnen we concluderen dat beide procesvariabelen een belangrijke invloed lijken te hebben op de twee resultaat variabelen. Beide procesvariabelen beïnvloeden rechtstreeks de uitkomst variabele 'onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek'. De variabele 'planning en uitvoering van praktijkgericht onderzoek heeft ook indirect invloed op beide uitkomstvariabelen. Beide procesvariabelen beïnvloeden indirect de variabele 'effectiviteitovertuiging t.a.v. doceren', via de bemiddelende variabele 'onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek'. Ten derde laten de resultaten een directe invloed van de variabele 'onderzoeksmotivatie' op beide resultaat variabelen zien. Zeker met betrekking tot de variabele 'onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek' heeft de variabele 'onderzoeksmotivatie' een duidelijke directe invloed. Deze invloed is tot twee keer zo sterk als de invloed van de procesvariabelen op 'onderzoekende houding en effectiviteitovertuiging t.a.v. onderzoek'. Op basis van deze bevinding kunnen we concluderen dat naast de proces variabelen ook onderzoeksmotivatie een belangrijke invloed heeft op beide resultaten.

CONCLUSIES EN GEVOLGEN

In *Hoofdstuk zes* worden de resultaten van de vier studies samengevat voor elk van de onderzoeksvragen, gevolgd door een algemene bespreking van de belangrijkste bevindingen met inbegrip van theoretische en praktische implicaties die kunnen

worden afgeleid uit de bevindingen. Tenslotte worden de beperkingen van de verschillende studies aangegeven en suggesties voor toekomstig onderzoek gedaan.

Over de vier studies heen kunnen drie belangrijke conclusies worden getrokken met betrekking tot de realisatie van praktijkgericht onderzoek door docenten (in-opleiding) in scholen voor voortgezet onderwijs en Opleidingsscholen in het bijzonder. Ten eerste bleek dat docenten en scholen bij het realiseren van praktijkgericht onderzoek met name gericht zijn op de realisatie van een onderzoeksomgeving in hun schoolorganisatie. Het betekent dat de realisatie van de randvoorwaarden voor het uitvoeren van praktijkgericht onderzoek in scholen relatief veel aandacht krijgt. In de tweede plaats bleek dat het uitvoeren van praktijkgericht onderzoek in scholen geen eenvoudig proces is voor docenten. Ten derde kan geconcludeerd worden op basis van de resultaten in de verschillende studies dat docenten (in-opleiding) verschillende (leer)opbrengsten percipiëren als gevolg van het uitgevoerde praktijkgerichte onderzoek zowel ten aanzien van het 'onderzoeken' als ook ten aanzien van het 'doceren'. Op basis van de resultaten kan ook worden geconcludeerd dat in termen van de percepties van docenten (in-opleiding), Opleidingsscholen er toe doen. De docenten (in-opleiding) participerend in ons onderzoek nemen Opleidingsscholen waar als meer positieve omgevingen voor het uitvoeren van praktijkgericht onderzoek dan niet-Opleidingsscholen. Lerarenopleidingen in Nederland zouden de toegevoegde waarde van deze Opleidingsscholen moeten erkennen en zich richten op deze scholen voor het opleiden van leraren. Hoewel praktijkgericht onderzoek een krachtige professionaliseringsactiviteit lijkt te zijn voor docenten (in-opleiding), dienen zowel opleiders als onderzoekers van zowel scholen als lerarenopleidingen te investeren in het realiseren van deze activiteit in Opleidingsscholen.

Scholen die praktijkgericht onderzoek willen implementeren als een professionaliseringsactiviteit zouden zich met name moeten richten op de motieven van docenten (in-opleiding) voor het uitvoeren van praktijkgericht onderzoek en het op de onderwijspraktijk gerichte onderzoeksproces zelf, in plaats van te investeren en zich te veel te concentreren op de context voor praktijkgericht onderzoek in scholen. Ook zouden de onderzoeksonderwerpen voort moeten komen uit de onderwijspraktijk van de docentonderzoeker zelf.

Kijkend naar de kwaliteit van het praktijkgerichte onderzoek in Opleidingsscholen, blijkt dat veel praktijkgericht onderzoek nog niet voldeed aan de criteria. Scholen zouden docentonderzoekers moeten tonen hoe goed/succesvol praktijkgericht onderzoek eruit ziet. Leraren zouden beter moeten worden toegerust: zowel voor het uitvoeren van kwalitatief hoogwaardig praktijkgericht onderzoek als ook voor

het doorvertalen van onderzoeksresultaten naar verbeteringen in de eigen onderwijspraktijk en voor het verkrijgen van inzicht in hun eigen leer- en onderzoeksproces. Om praktijkgericht onderzoek van mindere kwaliteit in de toekomst te voorkomen, zouden docentonderzoekers ook moeten leren om hun onderzoeksinspanningen (meer dan nu het geval is) zichtbaar te maken.

Ook met betrekking tot de implementatie van de onderzoeksresultaten in de onderwijspraktijk is nog een aanzienlijke ruimte voor verbetering. Om daadwerkelijk de onderwijspraktijk en het (eigen) handelen in deze praktijk te verbeteren, zouden docentonderzoekers meer aandacht moeten besteden aan de externe validiteit van hun onderzoeksprojecten gedurende het gehele onderzoeksproces. Zo zouden de implicaties van onderzoeksresultaten moeten worden omschreven en de wijze waarop deze implicaties mogelijk zouden moeten worden uitgevoerd en toegepast in de onderwijspraktijk. Tenslotte, zou een grotere nadruk op de verbetering van leren en de leerresultaten van leerlingen als gevolg van het praktijkgericht onderzoek door docenten (in-opleiding) nodig zijn.

A

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I shall surely acquire the capacity to do it,

Even if I may not have it at the beginning"

Mahatma Gandhi

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C

CURRICULUM VITAE

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