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# Teacher-researchers' expanding perceptions of research in a school–university collaborative research project

*Els Laroës, Lariké H. Bronkhorst, Sanne F. Akkerman and Theo Wubbels*

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### Introduction

Around the world teachers are increasingly encouraged to engage in research in their schools, often in collaboration with university researchers, and the project Closing the Gap exemplifies this in the English context. An emphasis on evidence-based teaching, as is clear in the Closing the Gap project, can be seen in other countries, for example in the Dutch government initiated programme 'Onderwijsbewijs' (Education Proof). This programme funded 37 studies, most of which were randomized controlled trials in which schools and universities worked together to evaluate educational interventions. As for CtG, an important aim was not only to gather evidence on what works but also to introduce and encourage schools to participate in rigorous research. Other examples are a grant scheme of the Netherlands Organisation for Scientific Research for teachers who want to complete a PhD and the 'Academic schools' that are quite similar to the English Teaching Schools in wanting to give schools and teachers an active role in research, development and innovation, among others, through involvement in initial teacher education.

The study presented in this chapter involved ten teacher-researchers who participated in a collaborative research project lasting for three years between four secondary schools and an educational department of a university in the Netherlands. The project was based on a project-plan, which was required for funding, and written by university researchers and principals of the participating schools. The teacher-researchers across four schools conducted research in their respective schools on the same theme, i.e., development of the quality of teacher feedback, in collaboration with university researchers. As this theme and the research design were established in the project-plan, the teacher-researchers were faced with a predetermined theme, '*teacher feedback to students that works*', and research design, as in the CtG project, an intervention study using a randomized experimental pre-test/post-test design with experimental and control groups. In this collaboration the evaluation aimed at teaching rather than measuring student learning, as was done in the CtG project. The ambition of the collaborative research stated in the project plan was to '*improve the actual*

*teaching practice* (i.e., contribute to school development) *as well as to gain more in-depth scientific insights*' (i.e., contribute to scientific knowledge development) into *'the effects of different teacher professional development interventions on the quality of feedback given by teachers* (i.e., contribute to teacher professional development) *in the different schools*'.

Teachers who do research in their own practice are referred to as teacher-researchers (Cochran-Smith & Lytle, 1999; Leeman & Wardekker, 2014). Research by teachers in schools is often conducted in long-term collaborative projects with university researchers. Such projects usually not only have a research aim but also intend to develop teacher-researchers' research knowledge and skills and by doing so expect teacher-researchers to use research and research results in their teaching practice as they come to appreciate research more (Cochran-Smith & Lytle, 1999).

Scholars have investigated various aspects of what has been described as 'teacher research', focusing on the impact of conducting research on teachers (Cochran-Smith, Barnatt, Friedman & Pine, 2009), on changes in beliefs and classroom practices (Zeichner, 2003), on teacher-researchers' motivation for engaging in research (Worall, 2004) and/or on different views of university researchers on goals of research by teachers (Cochran-Smith & Lytle, 1999).

An important aspect of research by teachers yet to be uncovered, is how teacher-researchers actually perceive research and how their research perceptions develop over time when conducting research in collaborative projects. This is relevant as, first, the collaborative projects in which research by teachers is often conducted are expected to achieve sustained effects in terms of teacher-researchers developing an academic attitude, for which perceptions of research are central (Akkerman & Bruining, 2016). Second, perceptions may influence research practice. For example, Brew (2001) argues that every research practice rests on the underlying ideas researchers have about what research is and what researchers are doing when they carry it out. These underlying ideas have been shown to differ among academics (Åkerlind, 2008; Brew, 2001) and are influenced by active engagement in research, according to Healey, Jordan, Pell and Short's (2010) study of university students. Studying the development of research perceptions over time may allow us to evaluate the expectation that by conducting research themselves teachers come to perceive research differently. Third, perceptions of research affect collaboration. Brew (2001) found that researchers with markedly different perceptions were unable to communicate effectively. In line with Brew's finding, literature on research by teachers in collaborative partnerships suggests that teacher-researchers and university researchers can only collaborate effectively if they understand how each partner perceives educational research (Ebbutt, Worrall & Robson, 2000).

If teacher-researchers' perceptions of research guide their research practice as academics' perceptions of research have been shown to do, it is relevant and timely to explore how teacher-researchers' perceptions of research develop over time when conducting research in collaboration with university researchers.

## Theoretical framework

### **Perceptions of research**

We see perceptions of research as the way research is understood, regarded or interpreted. In the literature, various perceptions of research can be discerned as different positions on a continuum ranging from *informal exploration*, 'getting to the bottom of something' (Bruggink & Harinck, 2012), to *more formal inquiry*, 'solving or improving a problem in the professional practice' (Cochran-Smith et al., 2009), to *rigorous research*, 'developing a generally applicable theory', 'theorising' or 'creating new knowledge' (Åkerlind, 2008).

Perception of research has itself been an object of investigation. A review on academics' perceptions of research indicated that these perceptions can be described in terms of views on the research process, questions, intentions and outcomes (Åkerlind, 2008). Åkerlind (2008) identified differences in academics' perceptions of research for each of these aspects. For example, the research process was perceived as a technical, rigorous and scholarly process investigating a research question, identifying and solving a problem, a creative process discovering something new and addressing community issues. Similarly, perceptions of research outcomes ranged from outcomes as academic publications, concrete products and personal understandings to outcomes as benefits to the community. Brew (2001) also focused on academics' research perceptions, which she described in terms of a structural dimension concerned with what research is. In addition, she distinguished a referential dimension concerned with the meaning given to what is perceived. Brew found a variation in the desired achievement of research and describes a varying focus on research as making it possible to solve practical problems, exchange products, discover underlying meaning and potentially lead to theoretical transformations. Bruce, Pham and Stoodley (2004) described academics' perceptions of research by focusing on views of what constitutes the significance and value of research. These views are described in terms of what research must be or achieve in order to be valuable. They found that academics experience the significance and value of research in different ways, which can be described in terms of an expanding impact of research, from impact on the individual researcher, to the research team, the research community and the world.

The three studies described above all investigated what academics' research perceptions are at a certain moment in time. Even though engagement in research is assumed to influence research perceptions, we have not found studies that investigated the development of (academics') research perceptions over time.

### **Research by teachers**

Research by teachers is increasingly seen as important internationally and also in the Netherlands. Based on earlier experiences with research by teachers in

English-speaking countries (e.g., Cochran-Smith & Lytle, 1999), Dutch schools and universities have initiated collaborative research projects in which teacher-researchers study their own practice.

Many researchers have pointed out that there is no consensus on the definition of 'teacher research' (Borko, Liston & Whitcomb, 2007; Cochran-Smith, 2002; Cochran-Smith & Lytle, 1999; Zeichner, 2003). In a review on the nature and value of research by teachers, Zwart, Smit and Admiraal (2015) show that teacher research is characterized differently in different studies. For example, Zwart et al. found that several scholars see critical inquisitiveness combined with a positive research attitude as central to teacher research. Others claim that teacher research entails the collaborative design of curriculum materials or consider teacher research merely a critical reflection tool that leads to innovation. Also, teacher research is seen in contrast with other types of educational research, for example, teacher research aims at examining educational practice instead of showing effects of interventions and improving practice rather than developing a generally applicable theory. Zwart et al. distinguish the four most common types of teacher research: action research, lesson-study, self-study and design-based study. Their review shows that although the nature and type of research is different, teacher research is mostly small-scale qualitative research into the school practice with limited generalizability of the findings. Likewise, in a review on teacher research, Zeichner (2003) reports that teachers use a variety of methods of doing research, including some not typically found within academic research communities such as action research, self-study or open-ended approaches.

Several aspects of research by teachers have been investigated, providing insight into, for example, the impact of doing research on teachers (Cochran-Smith et al., 2009) and into teacher-researchers' motivation for engaging in research (Worall, 2004). Little is known, however, about teacher-researchers' perceptions of research and how these perceptions develop. Moreover, by conducting research themselves, teacher-researchers are expected to develop a different perception of research, potentially resulting in a more positive attitude towards research, improvement of their research knowledge and skills and usage of research and research results in their educational practice (Coburn & Stein, 2010; Cochran-Smith & Lytle, 1999). Some scholars claim that research by teachers will lead to bridging the proverbial 'gap' between educational research and practice (Broekkamp & van Hout-Wolters, 2007; Levin, 2004).

In this study, we aim to describe teacher-researchers' perceptions of research and gain insight into how these perceptions develop during their engagement in research in a three-year collaborative research project in a school-university partnership. We describe teacher-researchers' perceptions of research in terms of their views on (1) what research is, i.e., descriptions of what '*research is*' and prescriptions of what research should be, i.e., what '*research ought to be*' and (2) what research can achieve or afford, i.e., descriptions of '*research makes it possible to*', '*with research you can*' and prescriptions of what research should

achieve/afford, i.e., '*research ought to make it possible to*'. The central research question is: how do teacher-researchers' perceptions of research develop during a three-year collaborative research project with university researchers? We expect that, by engaging in research, teacher-researchers' perceptions of research will change because of the increased familiarity with and knowledge about research through conducting research. This may result in a more positive perception of research, which is relevant as many studies have shown that teachers' appreciation of research is not favourable (Ebbutt et al., 2000; Gore & Gitlin, 2004; Shkedi, 1998). Knowing what teacher-researchers' perceptions of research are, and how these perceptions develop, can provide academics and teachers with tools to bridge the gap between research and practice.

## Method

### Context and participants

In each of the four schools involved, two or three teachers voluntarily took the role of teacher-researcher, which was conducted alongside their teaching. Within their school, these teacher-researchers formed a research group with a university researcher. The two university researchers involved were engaged as supervisors and each worked with teacher-researchers in two schools. The teacher-researchers designed, implemented and evaluated a professional development programme (henceforth '*intervention*') aimed at improving teacher feedback in their school. They fine-tuned the design of the intervention and the research into its local effects and conducted this research in collaboration with a university researcher over a period of three years. The teacher-researchers in this project had a background of a master's degree in the subject they teach (rather than in educational studies), which might mean their view of research is influenced by the research norm in their subject areas. Consequently, their experience with research in social and behavioural sciences, i.e., the type of educational research in this project, was often limited. Table 9.1 shows an overview of the participating teacher-researchers per school, their background and participation in the project and the university researcher with whom they collaborated.

### Interviews

Three group interviews with the ten teacher-researchers participating in the project were conducted over time for each of the four schools: at the start, in the middle and at the completion of the project. We conducted group interviews as the interaction in group interviews can stimulate elaboration and expression (Frey & Fontana, 1991).

The interviews were semi-structured. The first interview was conducted by the second author. To explore teacher-researchers' perspective on research, the

Table 9.1 Background of the participants and participation across the schools

School	TR	Gender	School subject	Previous research experience in social and behavioural sciences	Participation in project/ interviews	University researcher
A	TR1	Female	Dutch	-	Start to finish, all interviews	1
	TR2	Male	History	-	Start to finish, all interviews	
	TR3	Female	Dutch	Course in learning to conduct research in school one year previous to project	Start to finish, all interviews	
	TR4	Male	History	Course in learning to conduct research in school one year previous to project	Start to finish, absent at interview	
C	TR5	Female	PE	Three years as teacher-researcher previous to project	Start to finish, all interviews	2
	TR6	Female	Social studies	Master's in sociology and previous year student teacher in project	Start to finish, all interviews	
	TR7*	Male	Math	Three years as teacher-researcher previous to project	Start to halfway, interviews 1&2	
	TR8	Female	Arts	-	Joined project at start of 3rd year, interview 3	
D	TR9	Male	Biology	-	Start to finish, all interviews	2
	TR10*	Female	Social studies	Master's in public administration and organizational sciences	Start to halfway, interviews 1&2	

\* TR7 and TR10 left for reasons unrelated to the project.

interview included questions about how teacher-researchers designed their research and why they had chosen that way of working, about their concerns and challenges regarding research and about anticipated research findings. The second interview was conducted for each school and by the collaborating university researcher focusing on evaluating the research conducted in the previous year and looking forward to the teacher-researchers' research plans for the coming year. Although this interview was also semi-structured in that the interview scheme provided a number of topics, it was more open because of its evaluative and future-oriented nature. The third interview was again conducted by the second author and aimed at teacher-researchers' experiences in conducting research and the developments in their research throughout the project. In the interviews we questioned the teacher-researchers about what they were doing regarding research and why they chose to do so. Examples of follow-up questions are; 'I see, why do you do that, is that your research or what?' (interview 1). 'How do you see the research, what were your ambitions and are you satisfied?' (interview 2). 'Interesting. Are there any other things about research you found exciting to learn?' (interview 3). Such probing aimed to elicit answers that revealed the teacher-researchers' actions or theory-in-use, rather than their espoused theory (Argyris and Schön, 1974). As a result, the teacher-researchers described their actions, which may be governed by their theory-in-use, instead of describing their research perceptions by using words to convey what they would like others to think. We thus aimed to elicit answers revealing more implicit and perhaps less conscious views on research, which enabled us to deduce the teacher-researchers' research perceptions from the data.

The interviews were conducted at the respective schools and lasted about an hour and a half. They were audiotaped and transcribed verbatim.

## Analysis

First, transcripts of the interviews were segmented, excluding statements that were not relevant to our research question. These were mostly statements about the content of the intervention on feedback, the actual schooling of colleagues during the intervention, the collaboration with the university and the supervision of student teachers. Second, each interview, i.e., moment in time, was summarized in a matrix (Miles & Huberman, 1994). To account for possible differences between teacher-researchers within the schools (e.g., as a result of previous research experience) we analysed (the development of) teacher-researchers' perceptions on an individual level. These matrices contained a summary per interview of the teacher-researcher's views on (1a) what the teacher-researcher perceived research to be, i.e., '*research is*', (1b) what the teacher-researcher thought research should be, i.e., '*research ought to be*', (2a) what the teacher-researcher thought research can achieve or afford, i.e., '*research makes it possible to*', '*with research you can*' and (2b) what the teacher-researcher



thought research should achieve/afford, i.e., '*research ought to achieve/afford*'. Table 9.2 shows our description of the two aspects of the research perception and examples from the data.

Third, for each moment in time we identified teacher-researchers' *shared* perceptions of research, viz. shared by at least half of the teacher-researchers and contested by none. Shared perceptions of research were first summarized for each moment in time. Last, we compared the three shared matrices for each moment in time. This chronological analysis of the teacher-researchers' research perceptions resulted in an overview of the development of the teacher-researchers' shared perceptions of research over time (see Table 9.3). We illustrated the results with quotes, which we translated from Dutch into English.

Table 9.2 Description for the aspects of the research perception

Aspect <sup>a</sup>	Description	Examples from the data <sup>b</sup>
<i>Research is</i>	Research is defined by TR or described in terms of how TR sees research, what they think <i>research is</i> .	For our research we collect a lot of data, and every time we think of something new, we go back to the data and check this new insight. (TR5, interview 1)
<i>Research ought to be</i>	Research is described in terms of normative or ideal-typical value judgements. This can also be a prescription of what TR thinks <i>research should be</i> .	The research instruments should also be valid and reliable. (TR2, interview 1)
<i>Research can achieve/afford</i>	Research is described in terms of TRs' views on what they think <i>research can achieve or afford</i> .	Well with research you can show it, you know. Research findings prove that this works, so research shows that this is a good theme to focus on. (TR 9, interview 1)
<i>Research should achieve/afford</i>	Research is described in terms of normative or ideal-typical value judgements of what research should achieve. This can also be a prescription of what TR thinks <i>research should achieve/afford</i> .	Research always ought to start from a problem or a question. (TR1, interview 1)

a The aspects can be also be described in negative terms, such as contrasts or reversals.

b Utterances referring to research were signalled by: 1) phrases literally containing the word 'research', e.g., researcher, research plan, research question; and 2) words concerning research, e.g., analysis, data, qualitative, statistics, theory, university, validity.

The first author performed the analyses. To ascertain quality in all of the steps described, the first author provided a detailed description of the data and the analytic steps in the process of analysis (e.g., Poortman & Schildkamp, 2012). The steps and procedures were discussed with the second author, who reviewed all steps, decisions and interpretations.

## Results

Table 9.3 provides an overview of the development of the teacher-researchers' shared perceptions of research over time. Below, we also describe instances wherein teacher-researchers' perceptions differ. For each aspect of the research, perception descriptions are followed by prescriptions of what research is and can achieve.

### ***Development of perceptions of what research is and ought to be***

All teacher-researchers perceived research as an iterative process that involves several research steps at all three moments in time. According to the teacher-researchers, these research steps consist of asking research questions, developing 'measurement' instruments for data collection (TRs 1, 2, 3, 4, 9, 10, T<sub>1</sub>), analysing data to answer the research question and presenting the findings in a research report. All teacher-researchers said these research steps were 'theoretically grounded' (TRs 3, 4, 5, 6, 7, T<sub>2</sub>) and described in the theoretical framework of the research plan before conducting the research. From the first to the second interview the perceptions of what research is expanded as the teacher-researchers added several aspects to the research process, for example, 'formulating a hypothesis' (TRs 1, 2, 3, 4, 5, 6, 7, T<sub>2</sub>) and the research question 'which keeps changing' (TRs 1, 2, 3, 4, T<sub>2</sub>), that they did not articulate at the start of the project. Expansions also concerned more elaborate descriptions of research instruments for data gathering and analysis mentioned by all teacher-researchers, for example, as described by TR3:

We discussed how to analyse the questionnaires, you know: shall we group and code the concepts, or shall we score them individually. Well just some ideas that can guide the process of analysis. (TR3, T<sub>2</sub>)

At the end of the project, their descriptions of the research process and steps were less detailed again.

We found development over time in how teacher-researchers perceived the research design. At the start of the project, all teacher-researchers perceived research as being an experimental design involving measurements and statistics. Four teacher-researchers characterized data collection as a means to measure differences over time, i.e., pre-/post-intervention (TRs 1, 2, 9, 10). Three

Table 9.3 Development of teacher-researchers' shared perceptions of research over time (T1, T2, T3)

Additions to previous research perceptions are in italics.			
Aspects	Over time		
	Start of project T1	Middle of project T2	End of project T3
Research is	Research is an iterative process that involves research steps: asking research questions, collecting and analysing data to answer research questions and reporting on the findings. Research includes characteristics: theoretical grounding, methodical and systematic methods.	T1 + Research is an iterative process wherein: <i>research question keeps changing, hypothesis is formulated, research report is written including methods section, conclusions &amp; future research. More elaborate descriptions of research instruments &amp; analyses.</i>	T1
	Research is quantitative, longitudinal and large-scale: research is an experimental design involving pre-/post-tests and comparisons between experimental and control groups to show differences over time.	T1	Research can be quantitative, longitudinal and large-scale: an experimental design involving pre-/post-tests and comparisons between experimental and control groups to show differences over time.
Research ought to be	Research ought to be relevant to school practice: <ul style="list-style-type: none"> <li>– investigate existing problems/questions in school</li> <li>– provide clear results applicable in school practice</li> </ul>	T1	Research can also be qualitative, small-scale and short term to describe development over time.  T1 + present relevant and usable results to participants

	<p>Research ought to meet basic scientific criteria:</p> <ul style="list-style-type: none"> <li>– be reliable and transparent, i.e., justify research steps, use valid and reliable instruments</li> <li>– provide clear results that show pre-/post-intervention differences</li> </ul>	<p>Research ought to meet basic scientific criteria:</p> <p>T1 +</p> <ul style="list-style-type: none"> <li>– describe method and underpin findings</li> <li>– acknowledge references</li> </ul>	<p>Research ought to meet basic scientific criteria:</p> <p>T1 &amp; T2 +</p> <ul style="list-style-type: none"> <li>– be systematic and methodical</li> <li>– provide trustworthy results</li> <li>– relate findings to theories</li> </ul>
Research can achieve/afford	<p>Research makes it possible to generate findings that:</p> <ul style="list-style-type: none"> <li>– show change in relevant teacher behaviour</li> <li>– illustrate the effectiveness of interventions</li> <li>– prove what works</li> <li>– show how participants evaluate the intervention</li> </ul>	<p>Research makes it possible to generate findings that:</p> <p>T1 +</p> <p>Research can also provide results that describe:</p> <ul style="list-style-type: none"> <li>– development of relevant teacher behaviour</li> <li>– knowledge development of participants</li> </ul>	<p>Research makes it possible to generate findings that:</p> <p>T1 &amp; T2 + Qualitative research makes it possible to generate findings that:</p> <ul style="list-style-type: none"> <li>– describe knowledge development of participants</li> <li>– describe development of relevant teacher behaviour</li> <li>– underpin school policy</li> <li>– contribute to teacher professional development and school development</li> </ul> <p>With qualitative research you cannot provide evidence of effectiveness</p>
Research should achieve/afford	<p>Research should provide results that:</p> <ul style="list-style-type: none"> <li>– show pre-/post-intervention differences</li> <li>– show causal relations</li> </ul>		

teacher-researchers (TRs 1, 2, 3) mentioned that research entails measuring differences between experimental and control groups. One of these three teacher-researchers, however, made an explicit provision with respect to the reliability of such experimental designs regarding measuring differences on the level of students and stated that research could also be qualitative in nature because that is more reliable within the school context:

I think perhaps that it is even more interesting to look at the intervention qualitatively, I also think that is more reliable, you know you just take a teacher, or a couple of teachers, and you just follow them as in what were they like before the training and what did the training look like. (TR3, T<sub>1</sub>)

Halfway through the project, most teacher-researchers' view of research being an experimental design involving measurements and statistics had not changed. Three teacher-researchers from one school, however, considered 'taking on a qualitative approach' in which they would no longer use the questionnaire they designed as an 'instrument for measuring effectiveness' of the intervention but as 'input for our goals' (TR 5, 6, 7, T<sub>2</sub>). This can be seen as an indication that in their view research can also have a qualitative design. At the end of the project, we found that all teacher-researchers' views of what research is had expanded by additional views of what research could also be. All teacher-researchers described that, compared to the longitudinal and large-scale research in the project, research in schools can also be short-term and small-scale.

Throughout the project, all teacher-researchers perceived that research should be relevant to the school practice and should meet basic scientific criteria. According to them, the required relevance for the schools can be realized in various ways. First, throughout the project, all teacher-researchers indicated that research should investigate 'questions' (TR 9, 10, T<sub>1</sub>), 'research questions' (TRs 3, 4, T<sub>2</sub>) or 'problems' (TRs 1, 2, T<sub>3</sub>) in the schools. Second, research results should be applicable in the school practice, which in the opinion of TR1 is not the case as research results 'hardly ever reach the school', and if they do, nobody knows 'how to apply them' (TR1, T<sub>1</sub>).

Last, three teacher-researchers from one school argued that research should provide 'clear results', even though only positive results are seen as valuable to the schools. These teacher-researchers are aware that they 'obviously' want positive results in terms of improved teacher behaviour:

TR5: As a researcher that's perhaps not so interesting as long as you have a nice or clear result . . . Obviously, I want that those teachers, that it's added value, that you improve the quality of education within the school.

TR6: Do you mean that, suppose we find like, this type of session doesn't work at all, and we've learned how to change it, then you really have a result as well? Is that what you mean?

TR7: As researcher you certainly have a result.

TR6: As researcher you definitely have an outcome.

TR5: Yes.

TR6: Even if it's a very negative one.

TR5: Yes.

TR7: But then we're very dissatisfied. [T<sub>1</sub>]

At the end of the project, the relevance of research to the school practice remained an important norm for all teacher-researchers, which they sometimes described by contrasting research in a generic sense to their own research. According to them, their own research should 'really fit' with the school practice, whereas research often does not (TRs 1, 2, T<sub>3</sub>). Also, their research should present relevant and usable results to participants, but those results do not have to be 'academic' (TR6, T<sub>3</sub>).

All teacher-researchers perceived that research should meet basic scientific criteria, but the way they described these criteria developed over time. At the start of the project, all teacher-researchers mentioned criteria research should meet in general terms, such as 'be reliable'. Halfway through the project, the teacher-researchers detailed what research should be, e.g., 'describe methods section and underpin findings' (TRs 1, 2), 'acknowledge references' (TRs 9, 10). At the end of the project we found that teacher-researchers still described what they perceived research should be in a detailed way, such as 'be systematic and methodical' (TRs 5, 6, 8), 'relate findings to theories' (TRs 1, 2, 3, 4), 'provide trustworthy results' (TR 5, 6, 8, 9).

Looking at the development of their perceptions of what research is, the teacher-researchers perceived research as an iterative process involving research steps, which they described more extensively halfway through the project. All teacher-researchers started the project perceiving research design as quantitative, longitudinal and large-scale and at the end their perception expanded to research also being qualitative, short-term and small-scale. Similarly, their perception of what research should be developed in terms of an increasing degree of detail in which they described the basic criteria research should meet, while relevance for the school practice was a stable factor in the teacher-researchers' perception of what research should be.

### ***Development of perceptions of what one can and should achieve by research***

At all three moments in time, all teacher-researchers perceived that research could show change in relevant teacher behaviour, as the following quotes illustrate:

With our research we check if teachers have developed in terms of feedback behaviour. (TR 7, T<sub>1</sub>)

I think you can research what changes in the teachers' feedback behaviour. (TR 3, T<sub>2</sub>)

Our research showed there was little development in terms of teacher feedback regarding self-regulation. (TR 8, T<sub>3</sub>).

Regarding the provision of results showing effectiveness, however, teacher-researchers' perception of what research can achieve changed over time. At the start of the project, all teacher-researchers stated that research makes it possible to generate findings that illustrate the effectiveness of interventions and described that research can provide 'evidence' that 'proves what works' (TRs 1, 2, 9, 10, T<sub>1</sub>) and can 'show' and 'measure effects' (TRs 1, 2, 3, 4, 9, T<sub>1</sub>) in relevant teacher behaviour as a result of the interventions. As TR9 put it:

We set up an intervention because we want to improve them [teachers], and obviously we want to measure that with a pre-test and a post-test at the end, you know to measure the effects of the intervention. [TR9, T<sub>1</sub>]

Five teacher-researchers suggested that research can also provide insight into how participants perceive and evaluate the intervention and show 'what kind of intervention works well according to the participants' (TRs 5, 6, 7, 9, 10). Although they would like to show differences in relevant teacher behaviour as a result of the interventions, three of these teacher-researchers from one school (TRs 5, 6, 7) question whether this is possible. TRs 5, 6, 7 described this as:

TR7: Teachers who improve their teaching, change their behaviour. That only makes sense if students perceive it too. And the question is, whether you can measure that. Which doesn't mean that it didn't actually happen . . . It could be that the research shows that the teachers didn't score differently on the instruments. But that obviously doesn't mean that nothing changed.

Interviewer: Yes, and what do you expect?

TR5: I think that the pre-test and post-test will show a difference in terms of cognition. But I just don't know, I hope that perhaps it is visible on the videos [of teacher behaviour], but yes it's difficult to prove something like that . . .

TR6: That's really what we have been trying to do last year, to develop a measuring instrument that can actually show these kind of things. But I think we didn't find anything conclusive and I don't know if such an

instrument exists, either, I mean the perfect measuring instrument with which you can show every improvement. [T<sub>1</sub>]

Halfway through the project, the same three teacher-researchers expressed the view that research can also achieve different results, e.g., 'appreciation' and 'knowledge development' of participants in the intervention. (TRs 5, 6, 7, T<sub>2</sub>). TRs 3, 4 from school B showed a similar development regarding their perception of the kind of results that research can achieve. At the start of the project, TR3 stated that research could 'show results of the intervention' by 'measuring' development of teacher behaviour. Halfway through the project TR4 spoke about 'visualizing' development of teacher behaviour, while at the end of the project TR3 specified that with qualitative research you can 'describe' the development of teacher behaviour. At the end of the project most teacher-researchers specified that qualitative research could also provide valuable results that can underpin school policy (TRs 1, 2, 3, 4) and contribute to teacher professional development and to school development (TRs 3, 4, 5, 6, 8). This is how TR8 described their development:

We moved to more qualitative research (TR6: That you just look at individual participants. TR5: Yes) And we started looking more, not only at the participant appreciation, but also at possible results, irrespective of how much you can or can't prove. I think that's very valuable. (TR8, T<sub>3</sub>)

Only one teacher-researcher saw results achieved by qualitative research differently. Although TR9 stated that qualitative designs can also provide results, he perceived that such a design couldn't provide the 'quantifiable results' he desired:

The reason why we repeated the questionnaire, well I just couldn't resist the temptation to see whether after three years we could measure an effect, which again wasn't the case . . . So we focused on teachers that were open to learning, because I think that then you would be able to measure and show something about the effect. I still think it's very important that research measures effects. (TR9, T<sub>3</sub>)

TR9 persisted in his view that research should provide measurable results that show the effectiveness of the intervention, which relates to his perception of what research should achieve.

The earlier described relevance of research and its results to the school practice remained stable over time, but we found that the teacher-researchers perceived the type of results research should achieve differently over time. At the start of the project, most teacher-researchers indicated that research ought to show pre-/post-intervention differences (TRs 5, 6, 7, 9, 10). Halfway through the project, two teacher-researchers from one school specified that



research should ‘prove’ the effectiveness of the intervention (TRs 9, 10), while the other teacher-researchers perceived that research could also provide ‘valuable’ results, such as ‘development of teacher behaviour’ (TRs 1, 2, 3, 4) and ‘knowledge development of teachers’ (TR 5, 6, 7), without showing causal relations. Gradually, towards the end of the project, all teacher-researchers (except TR9) no longer described the type of results research should achieve, but they described the type of results different research designs could achieve, as we illustrated above.

Summarizing the development of the teacher-researchers’ perception of what research can achieve or afford, all teacher-researchers started the project perceiving that research could show the effectiveness of interventions. Over time, they perceived that with the type of research they used, you could generate different types of results, such as knowledge development of participants, but you couldn’t prove such causal relations. The teacher-researchers’ perception of the type of results research should achieve also developed over time. At the start of the project the teacher-researchers suggested that research *should* provide evidence of effectiveness, while gradually their perception of research results expanded as the teacher-researchers later suggested that research *could* achieve different types of results, which can be relevant to the school practice as well.

## Discussion

Our research question was: how do teacher-researchers’ perceptions of research develop during a three-year collaborative research project with university researchers? At all three moments in time teacher-researchers perceived research as a cyclical process involving several research steps, by which one can show results that should be relevant to the school practice, which according to the teacher-researchers means investigating problems in the schools and achieving results that are applicable in school practice. Also, teacher-researchers perceived that research should meet basic scientific criteria, such as being reliable, valid, systematic and methodical. These results resemble the views expressed by the trial coordinators in schools and reported in Chapter 7 of this volume.

The teacher-researchers’ perceptions of research correspond with how educational research is defined in the literature (Creswell, 2008). Similar to Creswell’s (2008) definition of educational research, the teacher-researchers perceived research as a process of steps used to collect and analyse data to answer a research question. Teacher-researchers’ detailed descriptions of research contrast with earlier findings of Vrijnsen-de Corte, Den Brok, Kamp and Bergen (2013), who found that teacher-researchers in Dutch professional development schools hardly referred to what research and the research process should look like and spoke of research in very general terms. The teacher-researchers in this project were explicit and specific about what research ought to be and gave detailed descriptions of research activities. This may be due to the teacher-researchers in this project being actively involved in conducting

research themselves, supported by university researchers, for three years. Also, our interview questions were directed at teacher-researchers' actions, instead of asking for perceptions directly, which also may have evoked more detailed responses.

Teacher-researchers' research perceptions in our project developed over time in three respects. First, the perception of what research is was described in terms of increasing methodological detail and with detail regarding which basic scientific criteria should be met (particularly visible at  $T_2$ ). The teacher-researchers' research-expanding perceptions seemed to be connected to (previous) experience with conducting research in social and behavioural sciences. For example, one teacher-researcher already perceived that research can also be qualitative at  $T_1$ , which could be due to her previous research experience. The increased details in their perceptions suggest an increased familiarity with and knowledge about research through conducting research.

Second, while at the start of the project teacher-researchers perceived that research is quantitative and experimental, at the end of the project they perceived that research can also be qualitative and more action-oriented. This development concurred with their expanded perception of the type of results research can achieve, as the teacher-researchers perceived that, in addition to achieving results regarding effectiveness, one can achieve different types of results with qualitative research (particularly visible at  $T_3$ ). The teacher-researchers' expanded perceptions of research could be explained in terms of growing insight into the different values of various research designs, reflecting Cochran-Smith's (2002) claim that different perceptions of research often concern discussions about the value of different types of research designs. At the end of the project, the teacher-researchers perceived that with qualitative research you could generate certain results, but not all the kinds of results they initially aspired to. This result reflects awareness of the complexity of the educational practice and the type of research that is possible in the school context described in the literature (Biesta, 2007; Leeman & Wardekker, 2014).

Third, while at the start of the project teacher-researchers suggested that research results *should* provide evidence of effectiveness, gradually their perception of research results expanded as the teacher-researchers described that research *could* achieve different types of results, which can be relevant to the school practice as well (particularly visible at  $T_3$ ). Teacher-researchers' initial perception of research could be explained by the project-plan, wherein the research design was predetermined. However, given that the predetermined theme of the intervention, feedback, was fiercely discussed by the teacher-researchers, we assume that the lack of discussion on the research design may indicate that the teacher-researchers' initial research perception was similar to the one described in the project-plan. It should be noted that, because of the project-plan, the teacher-researchers started doing a different type of research (experimental) compared to what is described in the literature as typical research conducted by teachers (Zwart et al., 2015).

Our teachers developed their understanding of what research is and can imply, which was one of the aims of the CtG project and was also a result reported in the first study in of this volume by teachers who were part of the early adopters programme. It is interesting that some of the teachers on the CtG project (Chapter 7 in this volume) moved from perceiving research in more qualitative action research terms towards: firstly, a group that saw qualitative and quantitative research as valuable and complementary to each other and secondly, those, particularly in the early adopter scheme, who saw RCTs as now the most valuable form of research. In the research presented in this chapter, teachers tended to move in the opposite direction from seeing research mainly as quantitative, and finding out what works, to valuing the insights qualitative research can provide. This difference may have been caused by a different starting position of the participating teachers. The CtG teachers seemed to have more experience with teacher research than the teachers in our study who on top of that initially were prompted in the research plan to think about participating in randomized controlled trial studies.

### ***Implications for educational practice***

We found that teacher-researchers initially perceived research as large-scale quantitative experimental research. Our findings suggest that such a perception of research may actually be counterproductive to reducing the distance teachers experience between research and practice. In accordance with our expectations, teacher-researchers' engagement in research led to a richer and more positive perception of research. In light of these findings, engaging teachers in research could be a stepping stone to bridge the gap between research and practice. The results furthermore might help educational researchers who collaborate with teacher researchers better understand their school counterparts and thus strengthen the collaboration effectiveness.

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