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Moving Beyond Practical Wisdom: Teacher Research in Secondary Education

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Abstract: Teaching in secondary education is mostly grounded in the practical wisdom of teachers. In general, teachers have limited knowledge of, access to, and interest in insights from scholarly work. Teacher research might be a way to move beyond practical wisdom as the only basis for good teaching. This study aimed to explore whether teacher research can encourage teachers' learning process as professionals, improve teaching practices, and generate knowledge about these practices. Participants were 44 experienced secondary school teachers in the Netherlands following a 2-year Master of Science professional development program on teaching and learning. Data was gathered using questionnaires, learner reports, a group interview, and participants' master theses. Thematic analyses of the combined data sources showed that the teachers report significant changes in the way they teach and think about teaching: they mentioned that they learned to take different perspectives when they are confronted with problems in their teaching and they reported being more focused in their teaching practice on what they want to change in their teaching. Concerning the third aim of generating knowledge, they mentioned challenges that are common for starting researchers such as how to formulate a researchable question, how to select relevant literature, how to deal with peer review, and how to perform situated generalization. We discuss what kind of educational research is valuable for teachers as learning professionals in secondary schools.

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Introduction

Teaching in secondary education is mostly grounded in the practical wisdom of teachers (Schwartz & Sharpe, 2010). Teachers have years of experience working with different instructional methods, tools, and formats. They are experts in their school subjects, knowing which learning strategies their students apply and which misconceptions they have. Teachers also have an accurate idea of the context in which they teach. However, teachers do generally have limited knowledge of, access to, and interest in insights from scholarly work (Beycioglu et al., 2013; Gore & Gitlin, 2004), even in settings that are assumed to provide a research-engaged environment for teachers such as Professional Development Schools (Vrijnsen-De Corte et al., 2013). Teacher research might be a way to move beyond practical wisdom as the only basis for good teaching. In addition, teacher research can be a valuable way to support improvements and innovations in teaching and might enable situated generalizations about teaching and learning (Imants & Van der Wal, 2020; McGann et al., 2020). More insight into the problems and challenges teachers encounter in scholarly research in school practice leads to understanding what kind of educational research is valuable for teachers as learning professionals in secondary schools. The objective of this study is to show whether teacher research can encourage teachers' learning process as professionals, improve their teaching practices, and generate knowledge about these practices.

Teacher Research

Many teaching practices are based on the practical wisdom of a teacher, which is in some respects problematic (Weimer, 2001, 2008). Firstly, the practical wisdom of teachers about teaching and learning is seldom connected with theories and concepts that are part of a shared knowledge base on teaching and learning. Secondly, the wisdom

of practice often is not well connected to empirical outcomes. The success of many techniques and approaches (as well as the failure of others) can often be explained in terms of well-known and documented theories, principles, and findings. Thirdly, there is seldom any sense of why some strategies, techniques, approaches, or practices work in some contexts and not in others. Systematic inquiry into the effects of teaching might overcome these problems with practical wisdom as the sole basis of teaching.

However, the impact of scholarly research in education on the educational practice in secondary school generally is low. Scholars examine problems that teachers in school perceive as irrelevant, want to publish in peer-reviewed journals instead of disseminating their work, and aim at the generalization of insights rather than improving school practice (Broekkamp & Van Hout-Wolters, 2007; Ion et al., 2019; Sjölund et al., 2022). Gore and Gitlin (2004) argue that these tensions between academics and teachers are related to the long tradition of framing educational research in a way that teachers are positioned primarily as ‘users’ rather than ‘producers’ of knowledge whereby the knowledge teachers produce is experiential knowledge and not valued (outside of schools) in the same way as knowledge produced by academics.

Proposals on how to bridge the gap between academic research, on the one hand, and educational practice and policy, on the other, focused on either researchers or their collaboration with practitioners. Ion et al. (2019) list several suggestions to improve research utilization by policy-makers and practitioners, such as more emphasis on research on research utilization instead of academic publications, more tailored dissemination of the research findings, more timely and relevant research, and policy briefs and summaries. The authors also stressed communication and collaboration of researchers, policy-makers, and practitioners. Vanderlinde & Van Braak (2010) also concluded that schools should create more opportunities for practitioners and researchers to collaborate, disseminate findings, co-construct ideas, and set research agendas. In more recent research, this kind of collaboration is summarized in research-practice partnerships (RPP; Coburn & Penuel, 2016; Sjölund et al., 2022). These RPPs are long-term and mutualistic partnerships between practitioners and researchers to improve children's and young adult’s educational experiences and outcomes. However, these proposals are not new and in many instances interaction and communication between researchers and teachers are still problematic as both teachers and researchers stick to their ‘traditional’ roles of knowledge user and knowledge producer, respectively (Schenke, 2015). This means that teachers expect researchers to be focused on their problems and practices, whereas researchers expect teachers to be able and willing to take up the research findings they produce.

Another way to close this gap between research and practice in secondary education might be scholarly research by teachers. Teachers might not only understand and design their practices by monitoring and evaluating teaching practices but also develop their professional skills such as a critical reflection on their own practice as well as on the practice of their colleagues. Of equal importance, teacher research can be a valuable way to use insights from the knowledge base on teaching and learning as well as to add new insights to it (Admiraal et al., 2014; Thomas, 2012). Teacher research can be described as teachers’ collection and analysis of data about school practice which is done in

a systematic and understandable way (Cochran-Smith & Lytle, 1993). This definition implies that other forms of reflective action by teachers might not be seen as teacher research, such as professional learning communities (Bausmith & Barry, 2011), teacher study groups (Thibodeau, 2008), critical friends groups (Curry, 2008), reflective practice (Osterman & Kottkamp, 2004) and literature circles, book clubs or reading groups (Daniels, 2002).

Aims of Teacher Research

Teacher research in secondary education is characterized by many studies, literature reviews, and meta-studies using different terminology, several aims, and various definitions. Teacher research is made up of a loose collection of programs, projects, networks, communities, and partnerships and takes various forms (Cochran-Smith & Lytle, 2009). The commonality seems to be that teacher research is focused on the improvement of teaching practice, albeit that the route towards this improvement is different. Teacher research is understood to be aimed at (Admiraal, 2013; Cochran-Smith & Lytle, 2009):

- Voicing the teacher;
- Learning of the teacher;
- Improving teaching practice;
- Designing teaching practice;
- Evaluating teaching practice;
- Monitoring teaching practice;
- Innovating teaching practice, and
- Generating knowledge on teaching.

Literature reviews and meta-analyses of teacher research (Anderson & Shattuck, 2012; Davis et al., 2009; Tan et al., 2009; Zwart et al., 2015) conclude that teacher research, in general, tends to include small-scale, qualitative research aimed at describing, understanding and evaluating their own teaching; hardly any claims are formulated about similar practices in a broader context (i.e. so-called “situated generalization”). Moreover, these reviews show that most teacher research consists of evaluation of teaching based on perceptions of teachers and students, with conclusions about and implications for the practice of the particular teacher doing the research. Quantitative or mixed-method studies using pre-test-post-test control group designs and test scores to deduce conclusions about the effects of teaching interventions are seldom. Finally, teacher research is rarely aimed at generating knowledge about teaching and learning by generalization to other populations, places, and points in time based on statistics or valid argumentation; instead, it is mostly focused on maximizing content or depth, which also can be understood as a quality criterion of educational research (Swanborn, 1996).

Types of Teacher Research

As mentioned above, the terminology used to indicate teacher research in secondary education varies. Five commonly used terms are Action research, Self-study, Lesson study, Design-based research, and Scholarship of Teaching and Learning. These five main types will be described below. Other terms used in the description of teacher research in secondary education are, for example, Practitioner inquiry, Narrative inquiry, Evidence-based

practice, and Practice-based evidence. The commonality of all these types of teacher research is that teacher research is focused on both grounding and improving teaching practice.

Action Research

Action research is teachers' research into their own teaching practice with the aim of understanding and improving their pedagogy and the impact of teaching on students' development within the societal context (compare the work of Wilfred Carr, Stephen Kemmis, Ken Zeichner, and Bridget Somekh in e.g., Carr, 2007; Kemmis, 2009, 2010; Somekh & Zeichner, 2009). Kemmis (2009) argues that action research is essentially critical or self-critical: it opens educational practice for discussion. The author distinguishes three types of action research: 1) *technical* action research which is guided by an interest in improving control over outcomes, 2) *practical* action research which is guided by an interest in educating or enlightening practitioners so they can act more wisely and prudently, and 3) *critical* action research which is guided by an interest in emancipating people and groups from irrationality, injustice, and harm or suffering. The first type of action research is mostly done by individual teachers examining their own teaching practice; the other two types are mostly executed collaboratively with other teachers and/or researchers. An example of technical action research on Content-Language Intergrated Learning (CLIL) is shown in Text box 1.

Text box 1
Example of technical action research on CLIL teaching.

Mearns (2012) reports on her technical action research into her CLIL teaching in a British secondary school. She examined a group of 30 students, age 13-14, over a six-week period, in order to understand the relationship between her CLIL-teaching method and students' motivation and achievement in the target language (German) and subject domain (personal, social and health education). She grounded her CLIL-teaching method on literature about effective CLIL teaching and second-language acquisition. The findings of this study were mixed. Only a small overall increase in student motivation for lessons in German language was found as many students struggled with a lack of confidence. With regard to attainment in the target language, the most able students exceeded their previous achievements significantly, although little improvement or even a decrease was noted in the achievement of the less able students. The author concludes with a discussion of the role of practitioner research in the academic community and formulates some conclusions about the setup of this kind of research.

Most action research is technical action research in Kemmis terms (Mertler, 2021), although collaborative forms gain popularity under the label of collaborative action research (Jones, 2023) and participatory action research (Stapleton, 2021). The former refers to mostly technical action research performed by a team of teachers and the latter to research into the teaching practice performed by a group of teachers and researchers. In participatory action research, teachers often have a limited role in the research process, ranging from executing a teaching intervention to collecting and analyzing data as well; reporting the results, however, is mainly done by the researcher. This means that most reports on participatory action research often are *about* teacher research.

Self-study

Self-study is traditionally known as research of teacher educators into their own teacher-education practice, based on their own teaching experience and expertise, and aimed at understanding and improving their own practice (see for an overview of key authors on self-study, Pithouse et al., 2009). A somewhat older definition of self-study is often used "Self-study is the study of one's self, one's actions, one's ideas, as well as the 'not self' (Hamilton & Pinnegar 1998, p. 236). Self-study implies that teachers reflect upon themselves as if they study a text and try to position themselves in societal and historical contexts (Berry & Kitchen, 2020). La Boskey (2004) identifies four aspects of self-study: 1) self-study is focused on improvement and is based on data that support this improvement, 2) self-study implies interactions with colleagues, students, and literature to ground interpretations, 3) self-study includes various, mostly qualitative research methods to provide an overview of the development process, and 4) results of self-study are shared with colleagues. The latter means that self-study has additional value not only for the particular teachers but also for their colleagues.

Lesson study

Lesson study originates from Japanese education and is collaborative teacher research, in which a team of teachers designs a lesson and observes, evaluates, and redesigns this lesson, starting a new cycle; each lesson is provided by one of the team members (Chokshi & Fernandez, 2004; Fernandez & Yoshida, 2004; Lewis et al., 2006). The teacher team meets after a lesson to discuss whether it should be redesigned and again evaluated or a new lesson should be designed, evaluated, and re-designed. In some cases, a team invites experts to share their knowledge on the subject, pedagogy, or curriculum or to bridge the ideas to scholarly work. In contrast to self-study and other forms of professional development, lesson study is focused on teacher work and student activities instead of the development of the teachers. The lessons and the research on the lessons should be understood as a collective product of a team of teachers.

In general, lesson study is thought to increase teachers' knowledge of the school subject and pedagogy, improve their teaching practice, expand their observation and reflection skills, strengthen their relationships with colleagues in school, and augment their self-confidence and self-efficacy in teaching (see e.g., Cardoso et al., 2023; Fox & Poultney, 2022; Vermunt et al., 2023).

Design-based research

Design-based research, sometimes referred to as design research or developmental research, is generally carried out by a teacher or pair of teachers, who design a lesson series based on insight from literature and teaching experience, implement and evaluate this lesson series, and redesign it on the basis of the evaluation and new insights from the literature. This redesigned lesson series can be the start of a new cycle of design, implementation, evaluation, and redesign (Tinoca et al., 2022). In general, the lesson series is innovative: about a new subject, a particular teaching method, an advanced assessment procedure, or newly developed educational materials or curricula. For an overview

of the characteristics of design-based research, see Kelly, 2003, 2004). In order to analyze data in design-based research in a systematic way, the CIMO logic (Context-Intervention-Mechanisms-Outcomes; Denyer et al., 2008) is developed. Using the CIMO logic, teacher-researchers are able to connect the design principles of their lesson series to specific outcomes via mechanisms that they observe in class.

Scholarship of Teaching and Learning

Scholarship of teaching and learning (ScoTL) – developed originally in the context of teaching in higher education- implies that teachers frame and systematically investigate questions related to student learning – the conditions under which it occurs, what it looks like, how to deepen it - and do so with a perspective not only improving their own classes but to advancing practice beyond it (cf. Weimer, 2008). ScoTL is more than research on student learning in their own teaching practice; it also means that teachers are engaged in the scholarly contributions of others on teaching and learning (Healey, 2000; Trigwell et al., 2000). Finally, ScoTL includes the communication and dissemination of aspects of practice and theoretical ideas about teaching and learning, being public, shared, peer-reviewed, and critiqued. This can be done through, for example, teacher portfolios (Kreber, 2006), mentoring colleagues (Weston & Alpine, 2001), or (peer-reviewed) publications (Richlin, 2001). In sum, in the scholarship of teaching and learning teachers:

- collect and analyze data about teaching and learning;
- link their problem to school practice;
- ground their research in literature;
- open up their research for peer review;
- publish their findings, and
- share outcomes in school.

So, Scholarship of Teaching and Learning is a form of teacher research that explicitly connects teaching practice to scholarly work, a reciprocal exchange between theory and practice (Godbold et al., 2023).

Problem of this Study

Based on the empirical studies, literature reviews, and meta-analyses on teacher research mentioned above, we conclude that the aims of scholarly research by school teachers on teaching and learning can be clustered into three main aims: 1) to develop their professional expertise in teaching and learning, 2) to further understanding and improvement of school practice en 3) to generalize insights into teaching and learning and share these situated generalizations with teachers and researchers. The research questions that directed the current study are derived from these three aims:

1. To what extent does teacher research support teachers' professional development?
2. To what extent does teacher research strengthen teachers' teaching practice?
3. To what extent does teacher research increase situated generalization of knowledge about teaching practices?¨

Methods

Context

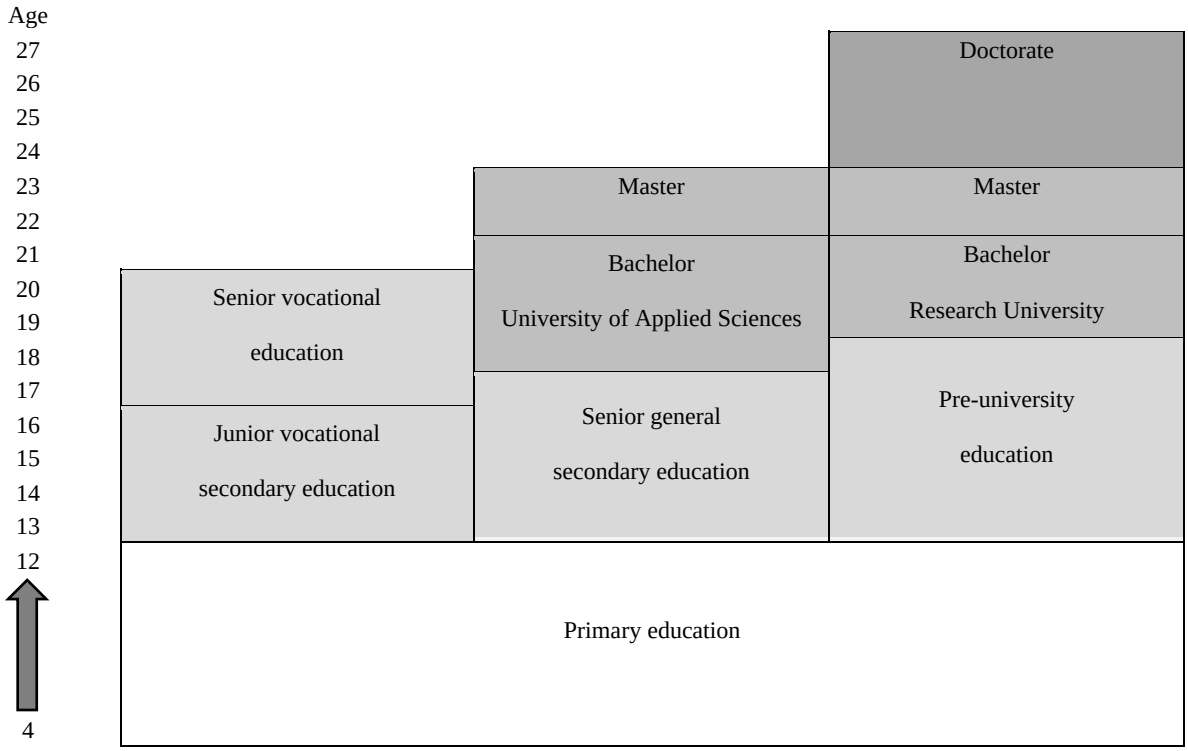
Dutch Educational System

The context of this study is a 2-year Master of Science program for secondary school teachers with more than 2 years of teaching experience. These teachers are licensed to teach at all levels of secondary education in the Netherlands (see light grey areas of Figure 3 about Dutch mainstream education). Dutch education is structured in a way that the final degree can be reached by several different study routes. This means that students have the possibility to switch from one level to another. There are around 700 secondary schools in the Netherlands, both publicly and privately run. There are three school levels of secondary education (the light grey areas of Figure 1):

- junior vocational secondary education is a preparation for a practical internship followed by work or a preparation for vocational education. This generally takes 4 years, depending on the subjects chosen.
- senior general secondary education takes 5 years and prepares for programs at the universities of applied sciences.
- pre-university education takes 6 years and is the admission level for research universities.

Figure 1

Mainstream education in the Netherlands



Teacher preparation includes certification at three levels: primary education, lower secondary education, and all levels of secondary education. The latter programs are mainly based in research universities and the former two programs are mainly organized by universities of applied sciences. After their certification teachers in secondary education, teachers can attend professional development programs or other forms of schooling, financed by their employer, government, and/or themselves. One of the government initiatives to stimulate teachers' professional development provides a scholarship that partly finances participation in professional development programs or master programs. The 2-year master's program which forms the research context of this study, is one of these programs. Secondary school teachers with at least two years of teaching experience were admitted if they were licensed as teachers of all levels of secondary education.

Master's Program

The 2-year master's program is a 50% part-time program with lectures, workshops, and conferences at the university, practical work in schools, and online supervision and peer tutoring. Scholarly research in teaching practice is a main theme throughout the curriculum. The program starts with a one-semester course on methods of educational research. After this course, participants set up their first research project, which is completed at the end of the first year. The second year starts with a small-scale study, in which program participants review literature on a particular topic, test a measurement instrument, or try out an intervention in their classes. Halfway through the first semester of the second year, they start their master thesis research, which is completed at the end of the second year with an article that is submitted to a scientific journal. Participants are free to choose their research topics and methodology for all three research projects. Most of them examine their own teaching (together with classes of their colleagues) although this is not compulsory. In order to guarantee the often-reported conditions of sufficient time and space for teachers to carry out their research, an agreement was signed between the university, school, and teacher.

In order to guarantee the often reported conditions of sufficient time and space for teachers to carry out their research, an agreement was signed between university, school, and teacher. Based on implications mentioned in the literature on professional development of teachers, four design principles were distinguished in the pedagogy of this master's program.

First, research by teachers could be best closely connected to their teaching practice (Juuti et al., 2021). In this way, teacher research aligns with the practical wisdom of teachers about teaching, motivates teachers and their colleagues because of its practical relevance and authenticity, and increases teachers' autonomy in teaching. Educational research about teaching and learning in secondary education in general and about topics at school and (national) policy levels includes research activities for which a teacher role seems to be less relevant. This means that the research projects in this master's program are closely connected to the daily teaching practices of the teacher-researcher.

A second design principle takes account of learning from experience or learning by doing (Leuverink & Aarts, 2022). In the master's program, teachers learn to develop their research skills by carrying out a research project and being fully responsible for the entire process from the setup of the research project to submitting it to a journal.

The third design principle includes the application of an apprenticeship model (Kyza & Agisilaou, 2022): teachers learn and work, not only together with other teachers, but also together and under the supervision of expert researchers. They (teacher and supervisor) co-author the publication of the master thesis that is submitted to a journal.

Fourthly, collaborative learning (peer feedback, peer assessment, inter-collegial support) is an important part of the pedagogy of the master's program (Jones, 2023). Collaborative research projects are stimulated, but whether teachers collaboratively examine their teacher practice or not, is up to them. Of the 29 research projects that have been completed and form the input for the results sections, only 3 projects were done in pairs; all others were individual projects.

Participants

Participants were from two cohorts of in total 44 experienced secondary school teachers (15 females) in the Netherlands (29 in cohort and 15 in cohort 2). All teachers have at least 5 years of teaching experience in secondary schools. They followed the 2-year Master of Science professional development program on teaching and learning described above. Of these 44 teachers, 29 completed the program, 5 left the program, 1 switched to another master's program in the university, 4 interrupted their program, and 6 were delayed.

Data

Data were gathered using questionnaires, learner reports, focus group interviews, and teachers' master theses. Email communication and informal conversations with peers and supervisors during lectures, workshops, conferences, and tutoring were used to give meaning to the other data. All data have been gathered and analyzed by the program supervisors. Participants provided active consent to participate in this study and research clearance was obtained from the University of Amsterdam, which was the host of this master's program.

Questionnaire

Program evaluation questionnaires were administered at the end of each semester. These were evaluation forms with open-ended questions about the teachers' evaluation of the tasks, assessments, planning, and time needed to complete the program, such as How do you evaluate the tasks of this semester? and To what extent did the tasks help you to learn about research and your research project? Participants were also asked to indicate what they learned from the program and to provide suggestions for improvements to the program. Each participant completed three questionnaires (after 6, 12, and 18 months), which means that for each participant three sets of qualitative data have been collected.

Learner report

Learner reports (De Groot, 1980; Van Kesteren, 1993) were gathered at the end of the third semester (month 18), which was at the start of the teachers' master thesis. The learner reports focused on participants' perceived learning outcomes of the program so far. Participants reported their learning experiences using prompts like "During the program I learned how…", "The program made me think…" or During the program I experienced that ….". For each participant, one set of qualitative data was collected concerning participants' reflections and considerations about what they learned about teacher research.

Focus group interview

At the end of the program (month 24), all teachers participated in a semi-structured focus group interview, one for each cohort. In addition to questions that were similar to the evaluation items of the questionnaire and the prompts of the learner reports, data were collected on how the participants perceived the effects of the master program and their research studies, in particular, on their professional development, their teaching quality, school practice, and quality of secondary education in general. Example questions were Do you see any change in your perspective of your teaching practice over the last years? and How do you perceive the teaching practice of your colleagues? This 2-hour focus group interview allowed participants to report on the value of teacher research instead of their direct evaluations of the program. Compared to individual interviews, focus group interviews have the advantage of using group dynamics, which enhances the likelihood that teachers will speak frankly about their experiences and ideas (Lederman, 1990; Smithson, 2010).

Master theses

The master theses were collected from the 29 participants who completed the program. All theses (10 in English, 16 in Dutch; 26 in total as three theses were carried out in pairs) had the form of a journal article of 6-10000 words. Each master thesis was summarized with following qualitative information: research intent (e.g., claims about teaching or learning, program evaluation), type of research questions (e.g., descriptive, explanatory or evaluative), participants, types of data (self-report techniques, registration techniques or literature and documents), location of the data (own classes, own school, other schools), methodology (quantitative, qualitative or mix-method), critical reflexity, and implications (teaching, school, policy, research).

Analyses

The data analyses was performed in five steps. First, the qualitative data from the teachers' evaluation questionnaires and learner reports were summarized, per participant and data source. The summaries of the qualities of the master thesis were added to this set of information. This led to a matrix with the participants in the rows and the themes addressed in the questionnaires, learner reports, and theses in the columns. Second, a thick description (Geertz, 1973) of each participant was composed of these written protocols indicating their perceptions on outcomes of participating in the program as well as the qualities of their theses. Based on these thick descriptions, a two-column format method (Argyris, 1993) was used to analyze the data, including the summarized materials in the first column and an

interpretative description by the researcher in the second column. These interpretations were summarized into outcomes concerning teachers' teaching practice, their professional development, and situated generalizations about teaching. The researcher's interpretations in the second column were checked and commented on by the four teachers of the program. Third, the interpretations per participant were combined for each of the three main themes, Fourth, the summaries of the focus group interviews were clustered in these three main themes and added to the descriptions of the third step. Fifth, data from email communication and informal conversations during and directly after the master's program were used to support or question these interpretations.

Findings

In line with the distinction of three types of aims of teacher research introduced earlier, we present the perceptions of the participants clustered in three sections: teachers' professional development, their teaching practice, and situated generalizations about teaching and learning.

Teachers' Professional Development

In all data, the teachers report significant changes during the 2-year program in the way they teach and think about teaching: on the one hand, they reported being more focused on what they want to change in their teaching, but on the other hand, they mentioned that they are more critical and take different perspectives when they are confronted with problems in their teaching. The participants also mentioned that were more critical than before when colleagues shared their teaching experiences and problems with them: they asked questions about the rationale of their teaching, what they wanted to achieve, why they tried out a particular way of teaching, and suggested some alternatives. The teachers reported that they not only reflected more deeply on the topic they did research on themselves but also on other topics: they tried to search for literature, analyze and translate the research outcomes to their teaching practice, and evaluate the implementation of new ways of teaching. Many teachers reported similar experiences like the following teacher in their learner report:

> *I read literature in a different way. Not so much from the beginning to the end, but critically searching for relevant information or information I can use for some colleagues in school. I also read the method section, which I used to skip, as I am curious whether the authors' conclusions can be defended.*

The teachers also reported effects on how they discuss practices of teaching and learning with their colleagues: they bring in alternative explanations for problems of their colleagues and different ideas on how to address challenges in teaching but also ask their colleagues critical questions when they come up with solutions that seem to be too easy or superficial.

Yet the participants not only reported effects on how look at their own teaching and teaching practices of their colleagues. They also mentioned that they feel more competent in the supervision of research done by their students. Small research projects are commonly used in the upper grades of secondary education to stimulate higher cognitive

learning processes of students and to promote the connection between secondary and higher education. The participants reported not only more knowledge about and skills in research methodology, but they also mentioned that they were more equipped to guide students and give them adequate feedback that enabled students to perform a small-scale educational research project in a limited time period. Additionally, being a learner themselves helped them to understand the position of their students in learning new knowledge and skills, such as carrying out a research project. An example to illustrate this is the following quotation from a focus group interview:

> *I am more confident in supervising students' Profielwerkstuk [a large research project students have to do in Grade 12] as I know more about formulating research questions that can be examined, detecting biases students can have towards their topic and which claims should be backed up with references and which ones not. But maybe most importantly, I now can feel how students might feel themselves when they do not have any clue what to do and why some actions are proper and others are not.*

However, they also mentioned challenges that are common for starting researchers such as how to determine and focus the research domain and topics to be examined, how to formulate a researchable question, how to select relevant literature, how to deal with peer review, and how to perform situated generalizations on the basis of their research project. In general, they are more aware of the complexity of educational research than before they started the program. This awareness also helped them to critically reflect on educational research carried out by university researchers and policy-makers. Instead of just accepting or ignoring these outcomes, they tried to reflect critically on the research methods and to get a thorough understanding of the results and implications. The teachers also became more aware of the separate worlds of teachers and researchers, as they called it in the focus group interviews:

> *I now also realize that many teachers do not read relevant literature, but many researchers also do not open up their articles for teachers who do not have extensive knowledge about sophisticated statistical analyses. I used to skip these parts, but now I try to read them, but still do not understand much of it.*

Teaching Practice

The participants mentioned considerably fewer comments about their teaching practices, compared to both other themes. An issue that is mentioned by all teachers is the difficult combination of research that is supposed to solve problems in their teaching practice and in school, and research that generates insights into teaching and learning that are beyond the local school practice. They reported that their school leader and their colleagues in school ask what they can learn from the results of the studies the participants carry out and how they can use these outcomes in their teaching practice. Although the participants were encouraged by the support of their school leader and colleagues, they also felt a tension that in many cases they needed more time to carry out their research project in a way they thought would give some reliable and valid outcomes. Actually, some of the teachers mentioned that their school leaders did not have any clue what it means to carry out school-based research projects and what a school can expect from the outcomes. A quotation from the focus group interviews illustrates this challenge:

I want to do research on my own teaching and how can revise some assignments, assessments, and some other parts, but both colleagues and school leaders are more interested in what this means for them. This means I have to ¨translate¨ my findings and ideas to what they possibly could get out of it. They do not understand that research is about a particular topic and in a particular context, which might be not exactly theirs, but that they still can learn from it.

Related to the professional development of teachers, participants mentioned in the group interview that they felt more competent to supervise school innovation projects, even if they were not experts in a particular domain. They felt confident guiding these projects with more distance, but also with more knowledge on how these should be evaluated and implemented. In addition, their research projects in the master's program gave them a network of teachers, within and outside school, with whom they planned new projects.

Situated Generalizations about Teaching and Learning

Research and learning to do research were the focus of the master's program of the participants as all participants already had a master's degree and attended teacher training programs. In this study, situated generalization is similar to do research on teaching and learning as it tries to generate insights from a study of a particular topic in teaching and learning in a particular context to more general principles of teaching and learning. In the group interview, many participants mentioned that they define relevant literature for teaching their school subject in a different way: some popular books or articles are replaced or supplemented by a set of articles from scientific journals as the latter provides, in their opinion, more rigorous evidence. In addition, teachers reported that they read this literature not only because they want to use it in practice, but also because they want to understand it thoroughly and to develop their professional expertise.

About 50% of the 29 teachers who completed their master's program published their thesis as an article in a scholarly journal. Some of the other teachers published their thesis or parts of it in outlets for school teachers, such as teacher conferences, websites, and teacher journals. Both the teachers who published in a scholarly journal and the ones who did not, mentioned that they found it difficult to write a compact article with generalizations about teaching and learning that go beyond the school context they included in their research projects. They also felt some challenges with receiving peer reviews and revising their manuscript accordingly. In their view, peer reviews emphasized their position as a learner, someone who still has to acquire new skills, although they understood that peer review is common practice in educational research and many researchers, even the experienced ones, have similar emotions. But the teachers also felt a lack of appreciation in the reviews of their studies as illustrated in the following quotation:

I got the feeling that the reviewers did not see any significance in what I examined. They only focused on the research methods and repeatedly said that the English language should be edited, without any positive remarks about the topic of study and the work I had put into it. If I would give feedback to my students like this, I would lose all my students.

In their thinking about future research activities, many participants mentioned that they planned to combine teaching and research on teaching. In the Netherlands, academic schools offer some teachers the possibility to carry out research projects, which are mainly focused on solving issues that are defined at the teacher or school level. However, there is only a limited number of academic schools and even within academic schools, a limited number of teachers (about 5% maximum) have research duties. Some teachers mentioned that they want to start a Ph.D. project, which is in the Netherlands a paid (part-time or full-time) job at the university. Three of the 29 teachers started a PhD and two submitted a PhD proposal for a scholarship system initiated by the government. Moreover, four other teachers became teacher educators in one of the teacher education programs and at least five teachers received other duties than teaching (research projects, management) and reduced the time they taught in class. This means that at least 14 of the 29 teachers who graduated did some research in addition to their teaching after their graduation.

Finally, all teachers mentioned challenges to write their master thesis in the form of an article that should be submitted to a scientific journal. Of the 26 master theses (three of them were collaborative work of two teachers), none of them were submitted directly after their graduation; teachers wanted to revise their articles on the basis of feedback they received as part of the final assessment of their thesis and feedback they received after they presented their research project at the international conference, which was the final meeting of the master program. Only seven teachers got their articles published in a scholarly journal and three submitted their articles but were still waiting for final approval.

Discussion and Conclusion

Research on teaching and learning requires methodological skills as well as knowledge about the domain that is the object of research. Most educational researchers possess the necessary methodological skills, but do not have access to educational practice and lack accurate knowledge about the particular area of teaching and learning they examine. Most teachers possess accurate knowledge and experience but might lack the skills to do rigorous research on teaching and learning. Yet it is common practice that research on teaching and learning is done by educational researchers, which means that knowledge about research methods is valued as more relevant than knowledge about the domain. Yet more teachers than educational researchers are trained to carry out practice-based research, which is typical for research teaching and learning. This study is about the experiences of teachers who participated in such a training program.

Teachers who participated in a master's program reported significant changes in the way they teach and think about teaching. They take different perspectives on teaching, look at alternative solutions for problems, and reflect more deeply on their own teaching as well as the teaching of their colleagues. They see teacher research as a valuable way to develop and deepen their teaching expertise. Their research projects also seemed to be relevant for school practice, although teachers felt tension with the school agendas, requiring fast results. Finally, although some of the theses were published in scholarly journals, teachers had difficulties with writing their theses in such a way that they could be published.

The above-mentioned findings imply that teachers are both willing and able to do scholarly research on their teaching practice. Teacher research might not only help to bridge scholarly research and practice on teaching and learning, it also supports the development of teachers' research skills, which are needed for the recently proposed research-practice partnerships (RPPs; Coburn & Penuel, 2016; Sjölund et al., 2022). In order to become effective, the participants in the RPPs should have knowledge, attitudes, and skills that relate to each other's main professional competence with researchers being able and willing to link to educational practice and teachers to connect to scholarly research. This is also emphasized by the importance of co-design (McGeown, 2023) or co-inquiry (Sjölund et al., 2022).

The scholarly research teachers performed in this study relates mainly to technical and practical action research (Kemmis, 2009) as well as to scholarship of teaching and learning (Weimer, 2008). Yet it can be a valuable way to address the three aims distinguished in the introduction section: to support the professional development of teachers, improve school practice, and generalize insights on teaching and learning. However, not in all contexts these three aims probably should be combined at the same time. In some contexts, a focus on one or two aims might be a better way to fully exploit the potential of teacher research. For example, student teachers might focus on doing research with the aim of developing their professional skills, experienced school teachers better focus on research that is strongly connected to issues that are relevant to their school, and teachers who follow a Ph.D. trajectory concentrate their efforts on generating insights for the scientific community. However, in many cases, these three aims of research by teachers can be combined and these combinations should be stressed more in research projects with schools and universities, with teachers and researchers, or in RPPs. In this way, we could both increase the impact of educational research and make teaching practices more evidence-based.

In the current study, the effects of attending the master's program and performing research into teaching and learning could not be separated. Future research with teachers who differ in their experience in both research and teaching might give better insights into the effects of teacher research. The combination of the four main design principles of the master's program examined in the current study (research closely connected to teaching practice, learning by doing, apprenticeship learning, and collaborative learning) was responsible for the positive effects on teachers' research knowledge and skills, although the participants suggested quite some improvements, such as higher intensity of research tasks, the addition of smaller research tasks as a preparation of the thesis, more examples and cases from teaching practice and more interest from school leader and colleagues for the research projects. A stronger focus on research in initial teacher education programs could provide a stronger basis for teacher research later in the career (c.f., Tatto, 2021; Van Katwijk et al., 2021).

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