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Baan, J.; Gaikhorst, L.; Volman, M.

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Professional development in inquiry-based working; the experiences of graduates from academic teacher education programmes

Jan Baan , Lisa Gaikhorst  and Monique Volman 

Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, The Netherlands

ABSTRACT

Research-intensive teacher education programmes aim to educate teachers to work in an inquiry-based manner, meaning that they should be able to use and conduct research to reflect on their teaching. Little is known, however, about how graduates of these programmes function and develop as teachers. In this study seven graduates of Dutch academic teacher education programmes were followed to investigate how their inquiry-based working developed during their first years of teaching. Interviews were conducted with these graduates and their school leaders over three subsequent years. Their involvement in inquiry-based working was found to shift from the classroom level to the school organisational level, with this shift being dependent on individual and organisational conditions. The results suggest ways to support teachers' professional development in inquiry-based working.

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Introduction

In the last decades, there has been an increased focus on inquiry-based working in teacher education. Teachers are expected to work in an inquiry-based manner; to use and conduct research to make well-informed decisions and to innovate and adapt their teaching to developments in our changing society (Munthe and Rogne 2015; Niemi and Nevgi 2014; Ulvik and Riese 2016). In many countries, teacher education programmes have incorporated training on teacher research with the intention of educating teachers who are able to conduct research and apply the findings thereof (Afdal and Spernes 2018; Davis, Clayton, and Broome 2018). As a result of the focus on inquiry-based working in teacher education, novice teachers will begin their careers with expectations about how they will do and use research in their jobs (Van Der Wal-maris et al. 2018; Willegems et al. 2017). However, there is a lack of knowledge concerning the development of teachers in terms of inquiry-based working during their first years of teaching. Do possibilities exist for teachers to actually use and conduct research? What are the challenges they faced, and what do teachers need to further develop their skills? This study explores these issues by following seven teachers in the Netherlands who recently graduated from academic

CONTACT Jan Baan  J.Baan@uva.nl  Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, The Netherlands

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teacher education programmes by investigating their development in terms of the ability to apply inquiry-based work skills.

Contextual background

In the Netherlands, academic programmes have been developed in several universities since 2008. Conventional professionally oriented programmes are bachelor's degree programmes, which are offered by institutes for higher professional education (Van Der Wal-maris et al. 2018). These institutes have a more practical orientation than universities, and the attention for research is limited. Although the academic programmes have existed for more than ten years, academic graduates are still a minority in most schools since only about ten percent of the student teachers follow an academic programme.

The aim of academic programmes is to encourage teachers to develop inquiring attitudes, to incorporate research findings into their teaching practices and schools and to conduct research (Snoek et al. 2017; Van Der Wal-maris et al. 2018). A previous study showed that in the academic curriculum, student teachers are introduced to a variety of research methods and international literature about teacher research. The focus on research is consistent throughout the four years of the programme. It was shown that academic student teachers had a more inquiring attitude than student teachers of the professional programmes and were motivated to use and conduct research as a teacher (Baan, Gaikhorst, and Volman 2020). Academically educated teachers are therefore expected to be able to work in an inquiry-based manner and to contribute to educational quality improvement in both their own classrooms and their school organisations (Van Der Wal-maris et al. 2018).

Theoretical framework

Inquiry-based working

The term inquiry-based working refers to a process of using and conducting research to evaluate and improve teaching (Uiterwijk-Luijk 2017). We use the expression 'inquiry-based working' instead of the more familiar 'inquiry-based teaching' (see e.g., Hollingsworth and Vandermaas-Peeler 2017; Kirschner, Sweller, and Clark 2006). Inquiry-based working goes beyond the walls of teachers' own classroom and also refers to working in an inquiry-based manner on issues at the school organisational level (such as school policy). In the literature, many different terms have been used to refer to this process, including self-study, data-based working, evidence-based or evidence-informed working, action research and lesson study (Cochran-Smith and Lytle 2009; LaBoskey and Richert 2015; Nutley, Jung, and Walter 2008; Schildkamp, Ehren, and Lai 2012; Zwart, Smit, and Admiraal 2015). Previous studies have indicated that novice teachers occasionally engage in certain elements of this type of research but do not usually conduct complete research cycles (Baan, Gaikhorst, and Volman 2018; Butler and Schnellert 2012). It appears that, in practice, novice teachers engage in the following forms of inquiry-based working: 1) systematic reflection, 2) using research and 3) conducting research (Baan, Gaikhorst, and Volman 2018). Teachers mostly engage in these forms of inquiry-based work in their classrooms in response to issues that arise in their teaching. For example,

teachers may consult relevant literature to obtain information about how to handle children with special needs in their classrooms. Some teachers also engage in these forms of inquiry-based working at the school level; for example, a teacher might conduct research concerning the effectiveness of a newly introduced teaching approach (Baan, Gaikhorst, and Volman 2018; Baan et al. 2019; Snoek et al. 2017).

Involvement of teachers in inquiry-based working

Several studies have focussed on the involvement of graduates of academic teacher education programmes during their first years of teaching (Davis, Clayton, and Broome 2018; Goodnough 2011; LaBoskey and Richert 2015; Maaranen 2009; Volk 2010; Afdal and Spernes 2018). These studies indicate that graduates are both competent and motivated to use and conduct research. However, novice teachers who have graduated from academic programmes appear to mostly engage in reflection and using literature and less in conducting research. Moreover, these forms of inquiry-based working are mostly conducted within their own classrooms but some teachers, especially those with roles in professional learning communities, have been found to be involved in inquiry-based working at the school level (Baan et al. 2019; Baan, Gaikhorst, and Volman 2018; Goodnough 2011). However, most of the studies mentioned, only focus on involvement of teachers one year after graduation. There is a lack of knowledge about how teachers develop in different forms of inquiry-based working in their first years after graduation and about the conditions that promote such development.

Professional development of novice teachers

Many studies have focussed on the professional development of teachers in their first years (e.g. Fox and Wilson 2015; Kelchtermans and Ballet 2002; Louws et al. 2017a; Menter 2015). With novice or beginning teachers, this study refers to teachers in their first five to seven years of teaching (Kelchtermans and Ballet 2002; Louws et al. 2017a). Novice teachers are in particular need of support related to the challenges that they will likely face during their first years of teaching (Gaikhorst et al. 2014; Louws et al. 2017a). The findings of previous studies may be relevant in developing an understanding of the development of novice teachers' inquiry-based working.

Menter (2015) identifies distinct phases in the professional development of teachers. The first two years are referred to as the *induction phase*, in which the development of teachers is solely based on adapting to the routines and approaches that are used in their schools. The development that teachers undergo during this phase is concerned with improving their teaching and deepening their understanding of the specific needs of their students and classroom management (Dicke et al. 2015). Thereafter, from anywhere between two to five years of teaching experience, the *early professional development phase* starts, in which teachers have more opportunities to deepen their teaching. In this phase teachers can develop a more inquiry-oriented approach and deepen their theoretical understanding. Finally, in the *Continuing professional development phase*, teachers may assume new roles in school organisations. A teachers may specialise in a subject or assume a formal leadership role at his or her school (Menter 2015). In such a leadership

role, teachers can contribute to school developments and influence their colleagues (Harris 2015).

Conditions influencing professional development

Teachers' professional development appears to be related to personal conditions on the one hand and cultural and structural conditions in the school on the other hand (Louws et al. 2017b; Kelchtermans and Ballet 2002). Personal conditions refer to a teacher's identity, expectations, motivation, knowledge and conceptions of good teaching. Structural conditions refer to both material aspects such as workload and schedules and to organisational aspects such as a teacher's position or role in his or her team. Cultural conditions refer to a shared school culture and vision and the existence of a culture of collective decision-making and collaboration (Louws et al. 2017b; Kelchtermans and Ballet 2002). Teachers, in their first years, report to find it difficult to teach in accordance with their own conceptions, knowledge and beliefs. The terms 'praxis shock' or 'reality shock' are often used to describe the difficulties that teachers experience in applying their theoretical knowledge in a practical context (Dicke et al. 2015; Veenman 1984; Willegems et al. 2017). The need to take full responsibility for their classes and a lack of time often cause teachers to engage in practices that clash with their understanding of good teaching (Kelchtermans and Ballet 2002).

In addition to these issues, teachers also join school organisations that have their own traditions, habits and relationships. Cultural and structural conditions can support a teacher's own conceptions when there is a shared vision concerning teaching or when a structure that corresponds with his or her values exists. In contrast, there can also be contradictions between a teacher's conceptions, values and needs and those of his or her school organisation. It is difficult for teachers to develop their abilities when there is a poor fit between their personal needs, knowledge and values and those of the school organisation to which they belong (Kelchtermans and Ballet 2002; Willegems et al. 2017; Louws et al. 2017b; Kelchtermans 2014).

It may be relevant to consider these conditions when attempting to understand teachers' development in inquiry-based working. With regard to personal conditions, teachers' involvement in inquiry-based working appears to be related to their expectations and motivation (Baan et al. 2019; Davis, Clayton, and Broome 2018). With regard to structural and cultural conditions, previous research has indicated that school culture, ideas about inquiry-based working held by members of a team, the role or formal position of a teacher, the school leader and the existence of a structure intended to support inquiry-based working (e.g., research groups) affect teachers' involvement in inquiry-based working (Baan, Gaikhorst, and Volman 2018; Baan et al. 2019; Davis, Clayton, and Broome 2018; Deluca, Bolden, and Chan 2017; Willegems et al. 2017).

Present study

This study fills a gap in the research literature by investigating how teachers who are specifically prepared for using and conducting research develop in terms of inquiry-based working in their first years of teaching and which opportunities schools (can) create for those teachers to do so. The following research questions were formulated:

- (1) : How does the inquiry-based working of academically educated teachers develop in their first years of teaching?
- (2) : What do teachers need in order to develop their inquiry-based working?

Method

To understand the development of teachers in their first years of teaching, a qualitative longitudinal approach, using semi-structured interviews in three consecutive years with seven teachers and their school leaders, was chosen.

Participants

Characteristics of the participants are presented in Table 1. All participants were graduates of one of three academic teacher education programmes in the Netherlands. The teachers were selected by purposeful sampling, 43 graduates and their respective school leaders were approached to participate in this study. Thirteen graduates and their school leaders were willing to participate. Some of the teachers were only teaching for one day at their school because they were studying, were working at different schools or combined their teaching job with other work. Those who taught for at least two days a week in one school and who were still working at the same school after three years were selected. The data of three teachers were removed from the analysis because they moved to another school or quit their teaching job. For most of the teachers we were able to interview their school leaders at all three moments of data collection. However, because of changes in school leaders' positions it was not always possible to interview the same school leader in each year. Table 1 presents information to clarify in which year interviews were conducted with each school leader. All teachers and their school leaders received an information letter describing the purpose of this research and signed it to indicate their consent to participate.

Data collection and instruments

Three semi-structured interviews were conducted by the same researcher (first author) in 2016, 2017 and 2018. These interviews were held with both the teachers and their school leaders. The duration of the interviews was approximately 45 minutes (for the teachers) and 30 minutes (for the school leaders). The interviews were held on a one-to-one basis

Table 1. Characteristics of the teachers and information on interviews with school leaders.

Name	Sex	Age	University	Experience*	Employment status	Interview with school leader in year
Joanne	F	26	1	4 th year	Full time	1 and 2
Peter	M	27	1	4 th year	Part time	1, 2 and 3
Steve	M	25	2	2 nd year	Full time	1, 2 and 3
Mark	M	24	2	2 nd year	Full time	1, 2 and 3**
Marie	F	24	2	2 nd year	Full time	1, 2 and 3**
Suzie	F	24	3	1 st year	Full time	2 and 3
Jill	F	24	3	2 nd year	Full time	1 and 2

*Experience at the time of the first interview. ** 2 different school leaders were interviewed because the first school leader left the school during the study.

and took place in the schools of the participants. The interview questions focused on the teachers' involvement in inquiry-based working. A distinction was made among three forms of inquiry-based working: 1) systematic reflection, 2) using research and 3) conducting research (Baan, Gaikhorst, and Volman 2018). Furthermore, questions concerning personal conditions, motivation and competences for inquiry-based working, as well as cultural and structural conditions in the teachers' schools, were included (Kelchtermans and Ballet 2002). Examples of questions are presented in Table 2.

The interviews with the school leaders featured similar questions and focused on the school leaders' perceptions of the academic teachers' development in inquiry-based working and the ways in which these teachers' research expertise was used in the school. Prior to the interviews, two pilot interviews were conducted with teachers who were familiar with inquiry-based working in schools. These teachers provided useful feedback from the perspective of practitioners concerning the interview guide and the language used.

Data analyses

The 'content analysis' method as described by Miles (1994) was used to analyse the interviews. As a first step, transcripts were made of the interviews. The authors then created a coding scheme, based on the literature, including the different forms and levels of inquiry-based working and personal, structural and cultural conditions (see Table 3). The first author used program Atlas.ti (version 7) to code the interviews, and matrices were created for each teacher in which the relevant fragments from both the teacher and the school leader interviews were organised. To enable a cross-case analysis, a matrix was created that included fragments from all interviews, grouped in such a way that each column contained fragments referring to a particular period in teachers' careers (see Table 4). Since the teachers' differed in their years of teaching experience and in later interviews sometimes comments were made concerning earlier years, this enabled us to construct a chronology. As a final step the cross-case analysis was performed, identifying patterns in the teachers' development in terms of inquiry-based working over the years and differences in the conditions that were mentioned.

Trustworthiness and reliability

The trustworthiness of the data was enhanced via several means: Interviews were conducted with both teachers and school leaders to collect information from different perspectives. The school leaders were also able to reflect on differences between the

Table 2. Examples of interview questions.

Topic	Examples of questions
Questions related to the teachers' development in inquiry-based working	Do you have the impression that you have been able to further develop your reflection skills since you graduated?
Questions related to cultural conditions	Can you describe the research culture at this school?
Questions related to structural conditions	(How) is time made available for conducting research, investigating relevant literature and/or engaging in reflection?
Questions related to personal conditions	Do you think you have sufficient knowledge and skills to successfully engage in inquiry-based working?

Table 3. Coding scheme.

		Description	
Development in Inquiry-based working	Reflection Classroom level	Referring to critical and systematic evaluation of practices in the classroom. For example using feedback of children or analyzing data.	
	Reflection School level	Referring to of critical and systematic evaluation of practices in the school organisation. For example observation of colleagues or reflection on new teaching approaches in the school.	
	Using research Classroom level	Using research about issues in one's own classroom. For example using research about behavioural problems in the class.	
	Using research School level	Using research about issues concerning the school organisation. For example the effectiveness of teaching methods.	
	Conducting research Classroom level	Referring to a cyclic research approach on educational issues in the classroom. For example research about interventions or new approaches in the class.	
	Conducting research School level	Referring to a research approach on educational issues in the school organisation. For example collaborative research processes.	
	Conditions	Personal conditions	Conditions related to the teachers' motivation for inquiry-based working, to their self-efficacy regarding their own teaching and to their competences for inquiry-based working.
		Organisational conditions	Referring to structural conditions such as the time for inquiry-based working, the support, the organization of research or professional development groups and a formal (leadership) function in the school. Referring to cultural conditions such as the way colleagues and the school leader are open for innovation and their motivation for inquiry based working.

academic teachers and other teachers in their schools. The interviews were recorded and transcribed verbatim to prevent interpretation bias. All teachers received the transcripts of their interviews for member check. None of the teachers or school leaders suggested or requested any adjustments. Furthermore, the coding of a sample of 10% of the interviews was evaluated by the second author. After discussion, there was complete agreement concerning the coding. Finally, the cross-case analyses were discussed by the research team. Direct quotes from the original interviews were included in the results section to illustrate and support the findings.

Results

1: How do academically educated teachers develop in inquiry-based working in their first years of teaching?

Teachers' development in systematic reflection at the level of the classroom

All teachers mentioned that, during their first years, their focus was on surviving, some even said that they felt relieved when they had completed each day's programme. The teachers mainly reflected on the routines in their classes and schools, and most of them adopted the same routines as their colleagues. In the second year, teachers began to reflect on how they might improve their own teaching as Suzie explained:

Table 4. Example of a cross-case matrix.

	Quotes concerning the first year	Quotes concerning the second year	Quotes concerning the third to sixth years
Code: Development in reflection	In the first year it was just following the programme of the day. Then you don't get around to it (reflection). Then it is just survival.	I think it is now a bit easier to evaluate. I have noticed that I can now see what a child needs more quickly.	I am less concerned with what is going on only in the classroom and now focus more on the school as a whole.
Code: Structural conditions	I think I'll first need to gain a position in the school where I am able to do that (inquiry-based working).	But you can see that it just takes a lot of time before something gets off the ground. Time is a hindrance.	Time, that is positive, but it is also negative, because I have a lot of time, but others don't have this time.

Last year, I just rolled through a bit about what the previous teacher had set up, and now I actually set it all up myself.

[. . .] I look more at my own class, like 'it's too hard for my class so I'm going to do another activity with them'. Simply much more aware, also in terms of differentiation.

Three teachers stated that they experienced more space for in-depth reflection after their first two or three years. This made them more aware of the needs of individual children, as described by Marie:

In the first year, I was mostly swimming and surviving, to be honest. So then you follow the lesson programme, and you are happy that you made it. Last year, I conducted a deeper analysis to identify the areas in which children make mistakes and why. This year, I am going deeper into it.

However, four other teachers reported that they underwent a different type of development: They mentioned a decreased tendency to engage in reflection during their third or fourth years. They stated that, due to their experience, their teaching became more routine. These teachers felt more confident about their teaching and did not feel a need to change or to reflect on it, as Suzie explained:

Well, on the one hand, I think I reflected more last year than I do now, because it was newer then. [. . .] Last year, I was finding out more, and I had to try new things, and I had to reflect on whether or not they worked. In that regard, it is now more based on routines.

Teachers' development in systematic reflection at the school level

During their first two years, teachers seldom said to reflect on issues related to their schools. However, the school leaders noticed differences in academically educated teachers' reflections compared to those of regular educated teachers, as explained by the school leader of Jill with regard to her second year:

What I do notice is that she [the academic teacher] looks very critically at everything, and that is quite special for a starting teacher. That is what I mostly see right now; she is critically analysing. [. . .] She is quick to identify issues both in the classroom and in the school organisation, and she is not afraid to give her opinion.

After their first two years, several teachers tended to engage in reflection at the school level. For example, Steve made the following observation regarding his third year: 'My ability to reflect at school level is developing because I have more ownership and I feel more involved since the end of the previous school year'.

Using research at the level of the classroom

The teachers' development in terms of using research was comparable to the development in systematic reflection. In their first year, teachers were focused on surviving. They indicated that they did not have enough time to use research to improve their teaching. Most teachers mentioned that they had more time for this in their second year. They mostly consulted literature concerning problems that they had experienced in their teaching (e.g. related to behaviour, reading or maths), as Suzie explained:

In the first year, I didn't really do much with it; it was more about survival then. I did search for literature about something from time to time when it was really needed. At this moment [in her second year], I am using literature focussed on behaviour, but I also have some books about the process of starting to read for example.

Four teachers reported that they were basing their teaching on literature less frequently after two or three years. Marie explained that this decrease was related to her experience:

Recently, I no longer frequently consult literature or my study books. This is much less than last year. My teaching is now based on my experience in practice, what I noticed last year and what worked. If it is still based on literature? I don't know anymore. Last year, I felt the need to search for literature to see if what I was doing was right. Now, I know whether it worked or not, so I don't have to search anymore.

Using research at the school level

Most teachers, especially in their second or third years, mainly focussed on using research in their own classes. Only two teachers consulted literature related to the school level. However, after four years, all teachers reported using research at the school level. The school leader of Peter also described how this teacher shares findings from the literature with his colleagues:

Peter always comes with articles, like 'Look, I found this article that mentions this'. That is really Peter, nobody else does that. Another teacher will also say that he has read something about a topic, but Peter does not show one study, but three studies. He never just mentions something without the support of literature; that is very special. He also sends it to colleagues.

However, both Peter and Steve noted that it was difficult to motivate their colleagues to apply the literature findings that they attempted to share. Peter became less motivated to share literature because his colleagues did not apply the findings that he shared:

I think that, in the first year, I was more enthusiastic about sharing things because, at that time, I had not experienced that it was very difficult to share literature. I think I have become a little less motivated to share things because it is not responded to in a way that motivates me.

In contrast, Steve noticed that he had come to promote and share literature findings more often over the years. He mentioned that he was capable of finding literature related to the subject; he also presented it in the teacher research group at his school.

What I am doing now is, for a meeting of the research group, I send some literature in advance. The literature then returns in the meeting, so I make it more important in the group. I really didn't do that last year.

Conducting research at the level of the classroom

Most teachers did not conduct research in their own classrooms over the years. Only two teachers provided some examples of conducting research in the classroom. Peter provided the following example:

The children complete a questionnaire about their social well-being in the classroom. They indicate who is close by, who is far away, who is sometimes kicked and who sometimes hits other students, etc. With that tool, you can set a number of conditions about how the members of the class should be grouped.

Conducting research at the school level

In contrast with conducting research in their class, most of the teachers had conducted research at the level of their respective school organisations. After having acquired three years of experience, six teachers had begun conducting research in their school organisations. Two teachers had already become involved in research at the school level during their first two years as teachers. Teachers mentioned to engage in different research projects. Marie, for example, conducted research focussed on maths education, and the social well-being of children. Two other teachers were involved in several research projects at their schools. Marie's school leader described her development as follows:

Last year, she really showed her added value in data-oriented research and organizing that. Most teachers don't do that. [...] She considers issues such as where we can obtain the right data, so that it is evidence-based. We have an assumption, but how can we check whether that is correct? She really has a role in this because she has learned that one must conduct a study based on three points of measurement to obtain valid results.

However, Marie herself mentioned that the research was not further used in the school and that she was not motivated to become involved in future research projects at her school as a result.

I received and analysed the data and also wrote a report about it, which I have shared. I was not completely satisfied yet, but, in the end, it was not used very extensively. So I thought that was a waste of my time and energy. That is perhaps why I am less involved in it now.

2. What do teachers need to develop in inquiry-based working at the level of their classrooms and the school level?

The analysis of the interviews revealed that there were differences in what teachers needed to develop their inquiry-based working in their first and subsequent years. Their needs also differed with regard to their development in inquiry-based working at the class and school levels.

Teachers' need with regard to development of their inquiry-based working at the classroom level

The teachers mentioned that, in their first two years, they needed enough freedom to experiment with different approaches and to evaluate these approaches using, for example, test results or observational data. When teachers wanted to test different approaches or materials, they needed a supportive school leader. As Marie explained, a relative lack of restrictions with regard to how teachers should approach their teaching is important:

Especially the freedom to do it. So, if you ask 'can I do this', they say 'yes, go ahead'. [...] That they don't say 'What are you doing?' So, especially from the management, it is important to exhibit an attitude that confirms what you want to do.

In their first two years, teachers made use of the literature and experiences provided by their teacher education programmes. After two or three years, most teachers needed new input to develop their teaching further and to find new challenges in teaching. In particular, teachers who felt confident in their teaching skills needed new challenges outside of their classrooms to further reflect on their teaching. Steve, for example, mentioned that, after two years, his involvement in research groups helped him to reflect on his teaching: *'I think that, through those research groups, you always learn to think about your own education'*. Joanne had enrolled in a course of study in her fourth year, which provided her with inspiration:

After graduation, it was just a bit of superficial evaluation of what I had done and what I wanted to do differently. Since I did my master's, my reflection has become more relevant, because I am expected to look much deeper than just what happened.

Through engaging in activities within their schools (e.g. participating in a research group) or outside of the school context (e.g. enrolling in additional courses), teachers are faced with new ideas, new literature or new approaches, which can inspire them to continue improving their teaching.

Teachers' needs with regard to the development of their inquiry-based working at the school level

In their first years, most of the teachers mentioned structural aspects as prerequisites to be able to develop in terms of inquiry-based working at the school level. The teachers described, for example, the importance of a formal role involving inquiry-based work at their schools, sufficient time, (external) support and the organisation of research groups. Steve, for instance, noted that *'We now have three research groups. We also have someone from the university who supports us. [...] Because I had time for it, I better organise these groups'*. Teachers who did not have a formal leadership role in their school organisations mentioned that such a role would have given them more opportunities to make use of and develop their expertise with regard to inquiry-based working. Peter, for example, explained what he would consider an ideal situation:

If, for example, I would teach for four days a week and for one day I would be doing research. In such a position I could also join the management team. [...] If I would be asked with innovations and changes in the school what my experiences are or what I know about it from research. So especially the recognition and also that position towards my colleagues.

There were differences in the years in which teachers first took on such a leadership role and how these roles were characterised. Marie and Steve already started to participate in research groups at their schools during their second years, and Steve's role within the school was formally described as 'research coordinator'. In this role, it was his responsibility to organise research projects and to motivate colleagues to engage in inquiry-based working. Mark, Peter and Suzie started conducting research in a professional learning community after their third years. They participated in such a community but did not

assume leadership roles. Joanne began to function as a teacher coach at her school in her fourth year, whereas Jill did not play such a role at all in her school organisation.

However, not all teachers felt comfortable playing a role related to inquiry-based working at the school level. For most teachers, self-efficacy with regard to their teaching was a prerequisite for their development in inquiry-based working at the school level. Teachers wanted to feel comfortable in their teaching before focusing on broader issues. For example, Joanne stated that *'Right now, I see myself primarily as a teacher, and I want to feel competent before I continue'*.

Teachers began to mention cultural conditions more frequently than structural conditions after having acquired three to four years' of experience. After having taught for a few years, most of the interviewed teachers stated that they had gained some experience in inquiry-based working in their school organisations and stated that their schools were important for their development. Four teachers mentioned school culture as having a negative influence on their ability to engage in inquiry-based work as Marie explained:

I noticed that, with the colleagues I worked with in the same age group, they were very much like the old-fashioned. And that it was very difficult to do something innovative. 'Yes but I have been doing this for 20 years', was often the reaction.

These teachers mentioned that their school cultures were not open to new developments or innovative approaches. This was a praxis shock for the teachers and hinders them to further develop themselves in terms of their inquiry-based working. In particular, many teachers mentioned that, during teacher education, they had believed that they would have the opportunity to apply their competences in terms of inquiry-based working to improve the quality of education in the schools in which they would teach. These teachers found it frustrating when their school cultures were not open to inquiry-based working. As Suzie mentioned,

During my study, I always thought when I become a teacher, I will see what can be improved and then look at how I can improve it. But, now, I think nobody is waiting for that, at least not at this school. Then why would I do that? So then I just do it in my own class.

Some school leaders also mentioned that there was a culture in which in which a teacher's years of experience were important for the development in inquiry-based working at the school level. The importance of teaching experience was mentioned frequently, particularly in schools where the majority of teachers had already been working for several years. Suzie's school leader expressed this as follows: *'She thinks she is just a little too young for that, you can do that if you have ten years of experience ...'* In these schools, it was difficult for younger teachers to feel competent enough to engage in inquiry-based working at the level of their respective school organisations. Other teachers mentioned that there was a positive culture with regard to inquiry-based working and that there were opportunities for innovation at their schools. In particular, Steve was very positive about the culture at his school: *'Concerning the research culture, everyone is very inquisitive; everyone is motivated. Everyone wants to move forward and wants to develop'*. His school leaders were also aware of his competences and were able to provide him with opportunities such as his position as a research coordinator to use and further develop these competences:

You can notice that he is smart. You can see that in his teaching and very much in his dealings with everything that he encounters in his teaching. In his role as a research coordinator, you see it

because he is working on different levels, in practice, with all the accompanying phenomena. But, at the same time, he also participates in a larger meta research organized by the university, and then he brings this knowledge to the research groups in the school.

With regard to personal conditions, the teachers also mentioned their own competences in collaborating in inquiry-based working. Four teachers mentioned that they had not learned how to motivate colleagues in inquiry-based working. For example, Peter stated: 'Perhaps I miss the skills of change management. At least, such a role (a formal position in inquiry-based working in the school), than it can also grow more. I might have too little persuasion or too few supporters'.

During their teacher education programmes teachers learned how to conduct research but not how to act in a leadership role concerning inquiry-based working, to involve a school team, how to collaborate in inquiry-based working and how to share literature with their colleagues. Some teachers received support within their schools in developing these competences, for example from their school leaders, or otherwise mentioned finding external support. For example, Joanne mentioned that, in her first years, she wanted to make changes over a short period of time but learned to be more patient:

Well, sometimes, my own ambition. I sometimes find it very difficult to wait. I want to be right, so I find it hard to admit that I am wrong or to think 'ok, I know I am right, but that is not yet coming, so I have to wait for a while and come back to it at a different time.'

Discussion and conclusion

A considerable amount of research has focussed on the professional development of teachers during their first years of teaching (Kelchtermans and Ballet 2002; Menter 2015; Willegems et al. 2018; Pithouse, Mitchell, and Weber 2009; Louws et al. 2017a). However, professional development in inquiry-based working has received little attention. This study aims to contribute to the existing knowledge by providing insights into the development in inquiry-based working of teachers who graduated from academic teacher education programmes.

Concerning the first research question (how do academically educated teachers develop in inquiry-based working in the longer term), this study showed that, during their first two years, the teachers interviewed focused mainly on survival in their classes. Thereafter, the focus of most teachers shifted to reflection and applying findings from the literature. However, after two years, when most teachers felt more confident in their teaching, there was a decrease in reflection and the use of literature in their classes. Teachers simultaneously became more focussed on inquiry-based working at the school level and became involved in conducting research at the level of the school organisation. Nevertheless, most teachers were not involved in conducting research in their own classroom. An explanation for this latter finding could be that conducting research is a time-consuming, complex and demanding process; maybe too complex for an individual teacher in his/her classroom, even if one has the knowledge to do so. However, although, we do see that teachers become involved in conducting research at the level of the school organisation. The reason for this difference in involvement could be that teachers are often more facilitated in terms of time for exercising research at a school

organisational level than for research at an individual level. Another explanation could be that the process of conducting research is too complex for individual teachers, and therefore, easier to conduct in collaboration with other teachers.

With regard to the second research question 2 (what do teachers need to develop in inquiry-based working at the level of their classrooms and the school level?), this study showed that, in their first years, it was important for teachers to have enough freedom to experiment in their classrooms. After gaining two years of experience, teachers needed new challenges, which often arose in activities outside of their own classrooms, to further develop their ability to engage in inquiry-based working in their classrooms.

Teachers' development in inquiry-based working at the school organisation level was found to be related to a combination of individual and organisational aspects. A school leader who is aware of the teacher's competences and motivation for engaging in inquiry-based working appeared to be important. In their first two years, most teachers mentioned conditions such as a sufficient time and a leadership role or function related to inquiry-based working as prerequisites for engaging in inquiry-based working at the school level. The study illustrates the possibility of academic teachers exercising leadership roles, such as research coordinator, in the beginning phase of their teaching career. From these roles, teachers were able to collaborate with colleagues in an inquiry-based way. We do know from previous research that this inquiry-based collaboration is important for systematic quality improvement in the school (Katz and Dack 2013; Godfrey and Brown 2019). We also know from the study of Verhoef, Volman, and Gaikhorst (2020) that such leadership roles are of particular importance for beginning academic teachers, because it enables them to work collaboratively inquiry-based and, in the end, to contribute to a culture of inquiry in schools. However, this study also shows that academic teachers do not feel adequately prepared for such leadership roles. For instance, they mentioned that they had experienced a lack of competences that are needed to involve colleagues in inquiry-based working and collaborate with them. Teacher education programmes obviously pay little attention to the development of such competences. Future research could focus on what is needed in both teacher preparation and school practice so that teachers can develop in such leadership roles.

After two years of experience, the teachers mentioned an open and innovative school culture wherein inquiry-based working is valued as being important for their development.

The results of previous studies that distinguished phases in professional development (Louws et al. 2017a; Menter 2015) were confirmed in this study. In their first years, the interviewed teachers were focussed on routines and surviving their daily classroom practice. It was difficult for them to develop their ability to engage in inquiry-based working due to work pressure, lack of time and their primary focus on classroom management. However, the development of the novice academic teachers in this study also seemed to proceed in ways that differ from those that have been previously established for novice teachers. First, they seemed to develop *faster* than the beginning teachers considered in the studies conducted by Menter (2015) and Louws et al. (2017a). For example, six of the seven academic teachers considered in the present study began to play a leadership role in which they engaged in inquiry-based working in the school organisation after two, three or four years of teaching experience; this is earlier than what

was found in other studies, in which novice teachers reported to play such a role after about five to seven years of experience (Louws et al. 2017a; Menter 2015).

The results also indicate that the interviewed academic teachers experienced a praxis shock (Dicke et al. 2015; Veenman 1984; Willegems et al. 2017) in their first years. The teachers in this study were educated in the competences required for inquiry-based working and were motivated to apply these in practice. During teacher education, several teachers developed the impression that they would work as teacher-researchers in schools and would be able to use their competences in inquiry-based working to both improve their own teaching and their school organisations (Van der Wal Maris 2017; Baan, Gaikhorst, and Volman 2020). However, after three years, some teachers became demotivated as they did not perceive their school cultures as supportive of inquiry-based working. The praxis shock experienced by these teachers did not concern a confrontation with the daily challenges of teaching, but was also related to a clash between their professional identities as teacher-researchers and their actual working situations, in which they were not able to use and further develop their competences related to inquiry-based working. Some of the teachers' descriptions of their school cultures were reminiscent of what has been described by Kardos et al. (2001) as a 'veteran-oriented professional culture' in which experienced teachers do not collaborate and do not feel the need to discuss their teaching.

However, other academic teachers were positive about their schools' cultures. When these teachers felt comfortable in their teaching, they were able to develop in roles in their respective school organisations in which they could work in an inquiry-based manner. In such roles, they were able and motivated to develop their competences as a teacher leader and in turn encourage their colleagues to engage in inquiry-based working as mentioned by Harris (2015). In this way, these teachers appeared to have had an important influence on the creation of a culture in their respective schools that supports inquiry-based working. Louws et al. (2017a) identified different needs in terms of the professional development of teachers during different stages of their careers; according to these authors, it is important that schools acknowledge and support teachers with specific needs. This study showed that academic teachers have specific needs in relation to inquiry-based working during the early stages of their careers; however, school organisations in the Netherlands do not always fulfil these needs appropriately. This is understandable, as academically educated teachers, who are specially educated to perform and use research in their schools, are a relatively new phenomenon. This study provides insights into how schools can stimulate their professional development in inquiry-based working. This is important to keep academic teachers motivated to remain in the teaching profession.

This study has some limitations. First, the teachers interviewed were all beginning their teaching careers, but there was variety in terms of their experience. One teacher had just started at the moment of the first interview, whereas another teacher was in his fourth year. However, we approached this by asking all teachers to reflect on their experiences in the first years, to be able to compare their experiences. Second, while the small-scale design made it possible to obtain detailed insights into the teachers' development in terms of inquiry-based working, it is not possible to generalise the results. In future research on the development of the inquiry-based working of (academic) teachers, a larger number of teachers should be involved.

This study has implications for (1) teacher education programmes, (2) school organisations and (3) educational policy. First, it suggests that academic teacher education programmes should not focus only on developing inquiry skills but also on how to apply these skills in the context of a school organisation. This implies learning how to involve other teachers in inquiry-based working. Examples of teachers who play a leading role in inquiry-based working in a school and discussions about the challenges they may face themselves could be a useful additions to the curricula of teacher education programmes.

Second, it is important that school leaders be aware of the specific needs of novice academic teachers. Teachers who are educated with the competences to reflect on issues related to a school organisation and who are motivated to do so should not have to focus on their own classes for five years or wait until their teaching skills have reached a certain level. They should be allowed to assume leadership roles and be invited to use their competences to improve the teaching in their school organisation sooner.

Finally, there are implications for educational policy. Can we expect beginning academic teachers to become involved in inquiry-based working in their first years of teaching, or are we expecting too much of these teachers? If these teachers are educated to work as teacher-researchers and being a beginning teacher is so overwhelming that many teachers are not able to apply their competences, they may lose interest in inquiry-based working by the time they feel confident in their teaching. Therefore, a structure in which academic teachers can use their competences should be created in schools.

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Notes on contributors

Jan Baan is a teacher in a primary school in Amsterdam, a teacher educator and a PHD student at the Research Institute of Child Development and Education at the University of Amsterdam. He is currently finishing his PHD theses on the contribution of academically educated teachers on inquiry-based working in schools.

Lisa Gaikhorst is an assistant professor at the Research Institute of Child Development and Education of the University of Amsterdam. Main areas in here research are teacher preparation, teacher professional development, urban teaching and beginning teachers.

Monique Volman is a full professor of Education at the Research Institute of Child Development and Education of the University of Amsterdam. Main areas in here research are learning environments for meaningful learning, diversity and the use of ICT in education.

ORCID

Jan Baan  <http://orcid.org/0000-0003-0648-7879>

Lisa Gaikhorst  <http://orcid.org/0000-0003-3285-9779>

Monique Volman  <http://orcid.org/0000-0001-9217-1402>

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