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The involvement in inquiry-based working of teachers of research-intensive versus practically oriented teacher education programmes

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HIGHLIGHTS

- Beginning teacher's involvement in inquiry-based working was investigated.
- Graduates from academic and professional teacher education programmes were compared.
- A survey was developed measuring teachers' involvement in inquiry-based working.
- Factors influencing teachers' involvement in inquiry based working were explored.
- Academic teachers were more involved in using research in their classroom.

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ABSTRACT

This study investigated the involvement in inquiry-based working of graduates of research-intensive (academic) and practically oriented (regular) Dutch teacher education programmes. Differences between graduates from both types of programmes were assessed through a survey among 201 beginning teachers. Graduates of both programmes were involved in systematic reflection and in using research, however, they were less frequently conducting research. While academic teachers perceived themselves as more competent than regular teachers in inquiry-based working, there were few differences in their actual involvement in inquiry-based activities. Participation in a professional learning community appeared to stimulate the involvement of academic teachers in inquiry-based working.

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1. Introduction

It has been argued for many years that teachers should be able to use and conduct research to evaluate and improve their own practices (Zeichner, 2003), as this contributes to their professional development and to school improvement (Borg, 2010; Mitchell, Reilly, & Logue, 2009). These new expectations of teachers call for a more academic orientation in teacher education programmes. In several countries such as the Netherlands, Norway, Singapore and Canada, there has been a tendency to start new academic teacher preparation programmes with an intensive focus on research in the curriculum (Darling-Hammond, 2017; Flores, 2017; Snoek, Bekebrede, Hanna, Creton, & Edzes, 2017; Van der Linden, Bakx, Ros, Beijgaard, & Vermeulen, 2012). In Norway and Finland, for example, student teachers carry out several projects during their

studies that involve inquiry into pedagogical issues in their schools and using methodological tools to analyse these issues (Maaranen & Krokfors, 2008). However, little is known about the results of academically oriented programmes in terms of the actual involvement of graduates using and conducting research when they start working as teachers. Studies in this area are qualitative and small scale (Davis, Clayton, & Broome, 2018; Hulse & Hulme, 2012; LaBoskey & Richert, 2015; Schulz & Mandzuk, 2005; Zeichner, 2003). Therefore, in this study, the graduates of academically and professionally oriented programmes in Dutch teacher education were compared regarding their involvement in inquiry-based working in their schools. We were also interested in the factors that enhanced or hampered the involvement of both groups of teachers in inquiry-based working.

We use the term inquiry-based working to refer to a process of using and conducting research to evaluate and improve teaching (Baan, Gaikhorst, & Volman, 2018; Uiterwijk-Luijk, Krüger, Zijlstra, & Volman, 2016). With the term academically oriented (or research intensive) programme we refer to programmes that are

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organised in a university, have a strong focus on research in the curriculum and are aimed at developing academic skills and critical thinking (Davis et al., 2018; Maaranen, 2009; Snoek et al., 2017). In these programmes, research is not only integrated as a project in the final year of the study but also in earlier phases. The aim of such academic programmes is to educate teachers as reflective practitioners, who reflect on their practice by using and conducting research (Davis et al., 2018; Maaranen, 2010).

1.1. Academic teacher education and teachers' involvement in inquiry-based working

As academic teachers are educated with the competencies for inquiry-based working, we expect them to use these competencies after graduation in their teaching practice. However, there is little knowledge available that supports this assumption (Koedel, Parson, Podgursky, & Ehlert, 2015). Some small scale studies have described teachers' experiences concerning inquiry-based working after graduating from an academically oriented teacher education programme, (Davis et al., 2018; LaBoskey & Richert, 2015; Maaranen, 2009; Volk, 2010). The results indicated that most teachers used research in their practices and reflected critically on their teaching, but although some teachers were motivated to conduct research, few teachers were actually involved in conducting research. However, these were small scale studies, each involving only one academic teacher education programme. Furthermore, these studies were more focussed on the influence of the programmes on teachers' identity or attitude towards research than on the actual research activities in which teachers were involved (Dunn, Harrison, & Coombe, 2008; Goodnough, 2011; Schulz & Mandzuk, 2005; Van der Linden et al., 2012; Vrijnsen-de Corte, Brok, Kamp, & Bergen, 2013)

1.2. Inquiry-based working

Different forms of inquiry-based working have been described in the literature, such as self-study (LaBoskey & Richert, 2015), data-based working (Cochran-Smith & Lytle, 2009; Datnow, Park, & Kennedy-Lewis, 2013; Schildkamp, Ehren, & Lai, 2012), evidence-based and evidence-informed practice (Biesta, 2010; Nutley, Jung, & Walter, 2008; Wiseman, 2010), action research, lesson study and design-based research (Chokshi & Fernandez, 2005; Zwart, Smit, & Admiraal, 2015). Previous research has indicated that many teachers are involved in elements of these types of research, but often not in the complete research cycles that characterise most of these research types (Baan et al., 2018; Butler & Schnellert, 2012).

In our conceptualisation of inquiry-based working we distinguish three different forms, namely, 1) using systematic reflection, 2) using research, and 3) conducting research. The first form, systematic reflection, refers to activities that result in a teacher's deeper understanding of his or her classroom (LaBoskey & Richert, 2015). However, we only consider reflection a form of inquiry-based working when it entails systematic and intentional aspects (Cochran-Smith & Lytle, 1999; Ellis & Castle, 2010; LaBoskey & Richert, 2015). Teachers can make use of e.g. observations, test results or feedback by students for systematic reflection on their teaching. Concerning the second form, using research as a teacher, two different approaches have been described in literature (Biesta, 2010; Nevo & Slonim-Nevo, 2011; Nutley et al., 2008). The first approach is evidence-based practice, which entails application of results of research into teaching effectiveness, or specific teaching interventions (Wiseman, 2010). In the other approach, evidence-informed practice (Biesta, 2010), research results are not directly applied in practice but teachers adapt research knowledge to their local context (Cordingley, 2008). The third form of inquiry-based

working is conducting research; when teachers conduct research they make use of the whole research cycle to analyse problems in their teaching, their classrooms or their school or to evaluate improvements that are being tried out (Zwart et al., 2015). This categorization appeared to connect well with how teachers are actually involved in inquiry-based working in their schools (Baan et al., 2018). Furthermore, we found that some teachers were using systematic reflection, were using research, or were incidentally conducting research at the level of their own classroom, whereas others were involved in inquiry-based research at the level of the school organisation. This conceptualisation of inquiry-based working, which distinguishes three different forms at two levels (classroom and school) was used in this study to describe the actual involvement of graduates from academic and professional teacher education programmes in inquiry-based working.

1.3. Factors influencing teachers' involvement in inquiry-based working

A considerable amount of research has focussed on the factors that influence the inquiry-based working of teachers. Both individual and organisational factors appear to be related to the extent to which teachers are involved in inquiry-based working.

Regarding the organisational factors, a literature review by Zwart et al. (2015) identified factors such as time, a supportive climate, ownership, the quality of support and access to sources. Time is mentioned in many studies as an important factor (Butler & Schnellert, 2012; Schulz & Mandzuk, 2005; Volk, 2010; Willekens, Consuegra, Struyven, & Engels, 2017). Teachers often experience inquiry-based working as extra work on top of their primary teaching task (Deluca, Bolden, & Chan, 2017; Willekens et al., 2017); they feel there is too little time available for inquiry. A supportive climate for inquiry-based working refers to a research-supportive culture and a research structure within the school organisation (Vrijnsen-de Corte et al., 2013). An important aspect of such a supportive culture is collaboration. Many forms of inquiry-based working require collaboration with other teachers. Therefore, it is important that there is a safe atmosphere in the team and a common focus on educational improvement (Deluca et al., 2017; Vrijnsen-de Corte et al., 2013). Furthermore, research by Uiterwijk-Luijk et al. (2016) and Deluca et al. (2017) showed that the competencies and motivation of colleagues for inquiry-based working had an influence on teachers' involvement in inquiry-based working. A research-supportive structure refers to the presence of team meetings where teachers collaboratively evaluate their teaching or where knowledge is shared (Butler, Schnellert, & MacNeil, 2015; Vrijnsen-de Corte et al., 2013). Ownership of teachers has been interpreted in different ways. Baan et al. (2018) referred to ownership as the freedom of teachers to make choices in their own teaching, to try out different approaches in their classroom and to influence the school's policy. Zwart et al. (2015) discuss ownership specifically related to teachers' roles in research; ownership then refers to autonomy and freedom of teachers to make choices in research projects. The factor quality of support refers to aspects of coaching in inquiry-based working by someone with more expertise. The review of Zwart et al. (2015) also pointed out access to sources as an important organisational factor. They recommended that teachers, who are involved in inquiry-based working, must have the ability to obtain relevant sources. A final factor is the role of school leaders; they can encourage inquiry-based working by being interested in teachers' inquiry-based activities and by linking inquiry and research to school development (Schenke, van Driel, Geijsel, & Volman, 2017).

In addition to organisational factors, several individual factors have been found in previous research that are related to inquiry-

based working. Firstly, the attitude or motivation and self-efficacy of teachers regarding inquiry-based working appeared to be related to their involvement in inquiry-based working (Vrijnsen-de Corte et al., 2013; Uiterwijk-Luijk et al., 2016). Vrijnsen-de Corte et al. (2013) also found that the years of teaching experience were related to the involvement of teachers in inquiry-based working (more experienced teachers were working more inquiry-based). Butler and Schnellert (2012), however, found that there were no differences in the involvement in inquiry-based working that could be related to teachers' experience. They pointed out that teachers who took on formal leadership roles in research projects in their school organisations were more involved in inquiry-based working. Previous research has also indicated that participation in a professional learning community (PLC) appeared to be related to the involvement of academically educated teachers in inquiry-based working (Baan et al., 2018; Newman & Mowbray, 2012; Willegems et al., 2017).

The studies discussed in this section provide insights into factors that are important for the involvement of teachers in inquiry-based working. However, these studies do not distinguish between factors that are important for teachers' participation in each of the three different forms of inquiry-based working (using systematic reflection, using literature and conducting research). Using reflection, using literature and conducting research may be influenced by different factors. Furthermore, most studies on this topic do not distinguish between beginning teachers from different orientations in teacher education (academic versus professional).

1.4. The present study

Previous studies have indicated a need for more research on the actual involvement of graduates from different teacher education programmes (academic/research-intensive versus professional) in inquiry-based working and on which factors influence this involvement. This study is focussed on academic and professional oriented initial teacher education programmes in the Netherlands. Teacher education institutes have a considerable amount of freedom to organise their own curriculum in the Netherlands. There is no national curriculum; only end goals are described, but the educational content is compiled by the institutes themselves.

Since 2008, several measures have been taken to increase the quality of primary teacher education. One of these measures was the organisation of academic programmes in six universities. The regular, professionally oriented primary teacher education programmes in the Netherlands are bachelor programmes organised in institutes for higher professional education (Van der Linden et al., 2012). These institutes have a more practical orientation than universities, and attention for research is limited. The aim of the academic primary teacher education programmes was to educate teachers with an inquiring attitude, who can use and conduct research in their own teaching practice and in their schools (Snoek et al., 2017; Van der Wal, Beijaard, Schellings, & Geldens, 2018). Academically educated teachers were thus expected to be able to contribute to the improvement of the quality of education in their own classroom and in the school organisation (Van der Wal et al., 2018). Both professional and academic programmes provide initial teacher education in a curriculum of 4 years. In both types of programme, there is a strong focus on the practical elements. Students spend at least 180 days in field experiences in primary schools. In the academic programmes, however, more attention is paid to both academic educational research and teacher research. Baan, Gaikhost and Volman (2019) investigated differences in the role of research in academic and regular programmes in more detail. In the regular programmes student teachers were involved in some forms of teacher research, often in the third and fourth year

of study only. In the academic programs, there was a strong focus on qualitative and quantitative research methods and student teachers learned how to analyse research results. In the regular programmes, student teachers conducted small scale studies but there was little attention for analysis of data and for validity and reliability. Furthermore, there was a difference in the use of literature; in the academic programme, the focus was mainly on scientific and international literature whereas the literature in regular programmes was more practical in nature.

This study focuses on the involvement of graduates of academic and regular programmes in inquiry-based working in their first year as teachers (we refer to these teachers as academic and regular teachers). A questionnaire was developed to investigate the following research questions:

1. To what extent are academic and regular teachers involved in inquiry-based working, and what are the differences between these groups of teachers?
2. How do academic and regular teachers rate the presence of factors that may influence inquiry-based working, and what are the differences between these groups of teachers?
3. What are the factors influencing the involvement of academic and regular teachers in inquiry-based working?

2. Methods

2.1. Respondents

An online survey was completed by 201 Dutch primary school teachers, 89 academic teachers (8 male, 81 female) and 113 regular teachers (8 male, 104 female). The average age was 27.13 for the academic teachers and 25.18 for the regular teachers. The years of teaching experience are displayed in Table 1. A purposive sampling strategy was used to select academic and regular teachers with similar teaching experience: only teachers working in a school for at least half a year for a minimum of 2 days a week and with less than six years of experience were asked to participate. The academic teachers were graduates of 6 universities. The regular teachers were graduates of 6 institutes for higher professional education. Teachers were invited to participate by email. Use was made of the correspondence data of several teacher educational institutes in the Netherlands. Teachers received a gift voucher after completing the survey. The data were analysed anonymously.

2.2. Variables and instruments

A questionnaire was developed, to answer the research questions of this study. The first part of the questionnaire focussed on teachers' involvement in inquiry-based working. The second part contained questions about the factors influencing teachers' involvement in inquiry-based working. Additionally, background

Table 1
Years of teaching experience.

Experience	Regular teachers (<i>n</i> = 112)	Academic teachers (<i>n</i> = 89)
Experience in teaching		
1st year	28.3 %	28.1 %
2nd year	28.3 %	28.1 %
3rd year	22.1 %	27 %
4th year	18.6 %	11.2 %
5th year	2.7 %	5.6 % ^a

^a Since academic teacher education only started in 2008 with a small number of students, the number of teachers working at a school at the moment of data collection (April–June 2017) was relatively low, especially teachers in their fourth and fifth year.

characteristics such as age, sex and teaching group were obtained.

Prior to the data collection a qualitative pilot study was conducted among six teachers to evaluate the content of the instrument on structure, readability and connection to educational practice. Based on the outcomes of this pilot, two items were removed (because these items appeared to be interpreted differently by the teachers) and four other items were adapted (because their formulation was too complicated).

The first part of the instrument was based on the outcomes of a previous qualitative study, in which three different forms of inquiry-based working were distinguished: (1) systematic reflection; (2) using research; and (3) conducting research (Baan et al., 2018). The first part of the instrument included 26 items related to these three different forms of inquiry-based working, on two different levels: (a) in teachers' own classrooms; and (b) in the school organisation. The 34 items, divided over 6 scales (systematic reflection, using research and conducting research at the level of the classroom or at the school level) are displayed in Table 2. Teachers indicated the extent to which the items applied to them on a 5-point Likert scale (1: *That does not apply to me at all*; and 5: *That applies to me completely*). Most items of this questionnaire were based on two instruments that have been used in previous studies. One was a questionnaire about the inquiring attitude of teachers (Meijer, Geijsel, Kuijpers, Boei, & Vrieling, 2016). The other was a scan that aims to determine to which extent schools are characterised by a professional learning culture (Schenke et al., 2015). Other items were based on the outcomes of our previous

qualitative study (Baan et al., 2018).

To confirm the presence of the six scales of inquiry-based working (systematic reflection, using research and conducting research, all at the teacher and school level), a confirmatory factor analysis was performed (using IBM Amos, version 25). The six-factor structure was evaluated using χ^2 fit statistics along with their associated robust comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardized Root Mean Square Residual (SRMR). Because of the sensitivity of the chi-square to sample size, we used the normed chi-square (χ^2 divided by df; Kline, 2015). Model fit was considered acceptable when normed chi-square is below 3.0 (Bollen, 1989), CFI falls within the range of 0.90–0.95 and RMSEA is ≤ 0.07 , with a confidence interval with an upper limit of 0.08 (Brown, 2006; Cheung & Rensvold, 2002; Lewis, 2017).

For the initial model, $\chi^2(614) = 1303.21$ and normed $\chi^2 = 2.12$ (1303.21/614). The goodness of fit estimates were CFI = 0.88, RMSEA = 0.07 with a 90% interval of 0.069–0.080. Because CFI was below the cut-off criterion of 0.90, items were evaluated on factor loading (factor loading should be > 0.40) and content (does the item reflect the content of the factor appropriately) to see if modifications could be made to improve model fit. Seven items were removed based on these criteria (for example, the item '*me and my colleagues observe each other's lessons and we discuss these lessons*' was removed from the reflection scale because the focus on observations seemed too specific). Furthermore, modification indices were inspected for possible further improvement of model fit. The

Table 2

Scales and items measuring inquiry-based working.

	Factor Loading	Cronbach's alpha
1. Systematic reflection in the classroom		.62
I reflect on my actions to check whether I should improve my approach.	.573	
By thinking about my actions, I have changed my usual approach in a number of ways.	.437	
If I recognise behavioural or learning problems, I think about what I can do differently.	.437	
2. Systematic reflection at the school level		.77
My colleagues and I reflect on the education in our school.	.821	
My colleagues and I reflect on our way of teaching.	.726	
My colleagues and I think about school wide issues.	.616	
3. Using research in the classroom		.89
I read publications or other sources to increase my knowledge about a specific educational topic.	.806	
I read books, articles and/or professional publications about education.	.683	
I surf the Internet to find interesting sources to use in my work.	.590	
When I identify behavioural problems or learning problems, I look for literature that focuses on this.	.747	
I make use of knowledge derived from literature to motivate the children in the class.	.722	
I apply things I read in research in my teaching.	.639	
I adjust my actions based on new knowledge.	.623	
I critically evaluate the research that I read.	.665	
I support my opinion using arguments derived from research.	.739	
4. Using research at the school level		.84
I share new insights about education with colleagues.	.787	
I talk with colleagues about research results.	.789	
I send articles that I read to colleagues.	.748	
My colleagues and I discuss how we can use approaches that are proven to be effective.	.719	
5. Conducting research in the classroom		.81
I design new teaching methods and evaluate these on the basis of observations or student results.	.547	
I use the research cycle (formulating a research question, composing a research design, collecting data, analysing and interpreting) to gain insight into the situation of individual children.	.856	
I use the research cycle to study my own teaching practice.	.948	
6. Conducting research at the school level		.88
My colleagues and I turn questions from the school into research questions.	.906	
My colleagues and I develop an approach for research focussed on questions from the school.	.926	
My colleagues and I use the research cycle in order to improve our education.	.835	
In our school I encourage the use of surveys, interviews or observations in to collect information about developments in the school.	.559	

items 'I critically evaluate the research that I read' and 'I support my opinion using arguments derived from research' had a high residual correlation. Since these items were based on critical thinking which was mentioned in our previous studies as a distinctive aspect of academic teachers in comparison to regular teachers (Baan et al., 2018, 2019) it seems theoretical plausible that these items measure the same aspect of inquiry based working. Therefore an extra correlation was added between these items. Model fit of the adjusted confirmatory factor analysis was acceptable: $\chi^2(283) = 595.39$, $p < .001$, normed $\chi^2 = 1.97$ ($595.39/283$), CFI = 0.90, RMSEA = 0.07 with a 90% interval of 0.061–0.078). Furthermore, all factor loadings were at least >0.40 , and most factor loadings were >0.6 (see Table 2).

The Cronbach's alpha of most of the scales indicated a good internal consistency. However, the internal consistency of the scale 'systematic reflection in the classroom' was rather low (Table 2). The first item of this scale had a kurtosis of 1.45 and a mean score of 3.96, indicating a ceiling effect.

The aim of the second part of the questionnaire was to investigate which factors have an influence on teachers' involvement in different forms of inquiry-based working. Therefore, factors derived from previous studies and existing instruments (Baan et al., 2018; Geijsel, Krüger, & Sleegers, 2010; Schenke et al., 2015, 2017; Uiterwijk et al., 2016) were translated into items related to the different forms of inquiry-based working. For instance, in the literature, the organisational factor of 'school leader' has been found to be an influencing factor for inquiry-based working (Geijsel et al., 2010; Schenke et al., 2017). In the questionnaire for this study, we specified this factor for systematic reflection ('school leader who stimulates reflection'), for using literature ('school leader who stimulates using literature') and for conducting research ('school leader who stimulates conducting research'). Another example is the individual factor of 'teacher motivation' which was specified as motivation for reflection, motivation for using research and motivation for conducting research. Teachers indicated the extent to which the organisational factors (9 items specified for the different forms of inquiry based working; time, ownership, school leader, collaboration, motivation of colleagues, support of colleagues, research supportive structure, (external) support on inquiry-based working and access to sources) were present in their school. Furthermore teachers indicated the extent to which the individual factors (5 items specified for the different forms of inquiry based working, namely; the motivation of the teacher, the competencies of the teacher, participation in a PLC and the teacher's years of experience) applied to them. Those factors were rated on a 5-point Likert scale with 1 being not present at all, and 5 being present to a large extent. The factors of teaching experience and participation in a professional learning community were rated in a different way. Teaching experience was rated in years of experience (1 = 1 year, 2 = 2 years, etc.). The factor of participation in a professional learning community was rated as 1 = no participation in a professional learning community, 2 = participation as a participant or 3 = participation as a coordinator or a leader.

2.3. Data analysis

For the first and second research question, two multivariate analyses of variance were performed to compare 1) academic and regular teachers' involvement in inquiry-based working, and 2) academic and regular teachers' perceptions of individual and school factors related to inquiry-based working. In both analyses, the independent variable was the type of teacher education (academic or regular). In the first analysis, the dependent variables were the average scores on the six forms of inquiry-based working (systematic reflection in the classroom, systematic reflection at the

school level, using research in the classroom, using research at the school level, conducting research in the classroom and conducting research at the school level). In the second analysis, the dependent variables were the scores on the items measuring the teachers' perceptions of the presence of these factors (for example, time, a stimulating school leader, collaboration and motivation of the teacher). Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity. One outlier was found and removed from the analysis. All other assumptions were met.

Regression analyses were used to answer the question, what individual and organisational factors influence the six forms of inquiry-based working. For each form of inquiry-based working, a regression analysis was conducted for academic and regular teachers separately, including all 13 items measuring individual and organisational factors as predictors. This resulted in a total of 12 regression analyses.

3. Results

3.1. To what extent are academic and regular teachers involved in inquiry-based working, and what are the differences between these teachers?

The mean scores of academic and regular teachers on the different forms of inquiry-based working are displayed in Table 3. The scores illustrate that both groups of teachers are mostly involved in systematic reflection, followed by using research. The mean scores of conducting research are relatively low. Furthermore, teachers appeared to be more involved in forms of inquiry-based working in the classroom than in forms of inquiry-based working at the school level.

A multivariate effect was found in the involvement of inquiry-based working of academic and regular teachers: $F(6, 195) = 4.05$, $p = .001$; Wilks' Lambda = 0.89; partial $\eta^2 = 0.11$. Univariate testing showed that the only difference between the two groups reaching statistical significance was using research in the classroom: $F(1, 201) = 6.00$, $p = .015$; partial $\eta^2 = 0.03$, indicating a small effect. An inspection of the mean scores indicated that academic teachers scored significantly higher on using research in the classroom than regular teachers did. No significant differences were found for the other forms of research.

3.2. How do academic and regular teachers rate the presence of factors that may influence inquiry-based working, and what are the differences between these groups of teachers?

The one-way multivariate analysis of variance on the factors related to inquiry-based working showed a significant difference between academic and regular teachers on the combined dependent variables, $F(28, 171) = 4.32$, $p < .001$; Wilks' Lambda = 0.59; partial $\eta^2 = 0.41$. Univariate between-subject tests showed several significant differences between the two groups of teachers. Due to the number of factors involved in the analysis, only the significant differences are displayed in Table 4. The academic teachers appeared to score lower on school organisational factors (namely, time, team motivation and support) than the regular teachers. This means that the academic teachers perceive these factors as being less available in their organisation. In contrast, mean scores of the academic teachers on several individual factors (self-reported competence and motivation) were higher than those of the regular teachers. This indicates that academic teachers see themselves as more competent regarding all forms of inquiry-based working and more motivated for systematic reflection.

Table 3
Differences in the involvement in inquiry-based working between academic and regular teachers.

	Academic mean (SD) ^a	Regular mean (SD) ^a	F	p	partial η ²
Systematic reflection C ^b	4.37 (.47)	4.35 (.47)	3.50	.063	.017
Systematic reflection S	3.62 (.75)	3.47 (.89)	1.66	.199	.008
Using research C	3.66 (.69)	3.41 (.75)	5.57	.019	.027
Using research S	3.00 (.82)	3.00 (.91)	0.12	.727	.001
Conducting research C	2.55 (.99)	2.43 (.93)	0.79	.377	.004
Conducting research S	2.12 (1.01)	2.29 (1.01)	1.47	.226	.007

Note: Significant p-values (≤.05) are reported in bold type.

^a Mean scores on a 5 point Likert scale (1 = not applicable to me at all., 5 = fully applicable to me).

^b C = in the classroom and S = at the school level.

Table 4
Differences between the perceptions of regular and academic teachers concerning influencing factors for inquiry-based working.

Factors with significant difference ^a	Academic mean(SD) ^b	Regular mean (SD) ^b	F	p	partial η ²
Time to C.R. ^c	1.89 (.94)	2.21 (.99)	5.30	.018	.028
Motivation team to C.R.	2.42 (1.04)	2.80 (1.02)	6.85	.010	.033
Support in U.R.	1.94 (.89)	2.43 (1.05)	12.53	<.001	.060
Support in C.R.	1.83 (.94)	2.35 (.110)	12.51	.001	.059
Access to sources	2.34 (.99)	3.20 (.91)	40.25	<.001	.169
Competencies related to S.R.	4.38 (.67)	3.96 (.76)	16.62	<.001	.077
Motivation related to S.R.	4.26 (.80)	3.83 (.95)	11.71	.001	.056
Competencies related to U.R.	4.06 (.70)	3.32 (.91)	39.05	<.001	.165
Competencies related to C.R.	4.01 (.71)	3.37 (.89)	30.55	<.001	.134

^a Only the factors with significant differences are included in the Table.

^b Mean scores on a 5 point Likert scale (1 not present at all, and 5 present to a large extent.).

^c S.R. refers to systematic reflection, U.R. refers to using literature C.R. refers to conducting research.

3.3. What are the factors influencing the involvement of academic and regular teachers in inquiry-based working?

3.3.1. Factors influencing the involvement of academic teachers in inquiry-based working

Table 5 shows several factors with a significant influence on the different forms of inquiry-based working for the academic teachers. *Participation in a PLC* appeared to have an influence on using and conducting research at the school level and on systematic reflection in the classroom. The *motivation* of the teachers for inquiry-based working appeared to have an influence on systematic reflection and using research in the classroom and on using research in the school. *Competences* for inquiry-based working were related to reflection in the classroom. Furthermore, the organisational factors of *time*, the motivation of the team and the *support of colleagues*

were related to different forms of inquiry-based working.

3.3.2. Factors influencing the involvement of regular teachers in inquiry-based working

The results of the regular teachers (Table 6) demonstrate that the factor of *access to sources* and *teaching experience* were related to the involvement of the regular teachers in several forms of inquiry-based working. Additionally, *motivation* appeared to have an influence on using research in the classroom and at the school level and in conducting research at the school level. *Time* was related to conducting research in the classroom and in the school. Furthermore, factors such as *a stimulating school leader* and *collaboration* had an influence on systematic reflection at the school level. Finally, *competencies* for using research had an influence on using research in the classroom.

Table 5
Regression analysis of individual and organisation factors (academic teachers).

Factors	Systematic reflection C		Systematic reflection S		Using research C		Using research S		Conducting research C		Conducting research S	
	b (s.e.)	p	b (s.e.)	p	b (s.e.)	p	b (s.e.)	p	b (s.e.)	p	b (s.e.)	p
Time	.052(.047)	.638	.313(.066)	.002	.041(.076)	.718	.179(.086)	.102	.034(.168)	.829	.218(.135)	.100
Motivation of the team	-.054(.056)	.666	.316(.078)	.005	-.160(.080)	.191	-.195(.090)	.096	-.161(.157)	.329	-.105(.126)	.438
School leader	.141(.050)	.236	.167(.070)	.135	.048(.063)	.682	.134(.072)	.234	.141(.135)	.397	.095(.108)	.487
Ownership	-.176(.052)	.082	-.173(.073)	.054	.126(.089)	.249	.022(.101)	.830	.102(.145)	.490	.144(.116)	.237
Collaboration	.225(.064)	.063	.100(.090)	.346	-.028(.093)	.811	.179(.106)	.115	.014(.159)	.920	.085(.127)	.461
Support of colleagues	-.221(.052)	.071	.017(.073)	.875	.017(.078)	.890	.286(.088)	.016	.096(.129)	.497	.016(.103)	.891
Supportive Structure	-.117(.040)	.279	.061(.056)	.522	.022(.070)	.847	.166(.080)	.124	-.044(.096)	.757	.009(.077)	.941
Support on inquiry-based working	-.019(.053)	.869	.060(.074)	.566	-.013(.097)	.914	-.124(.110)	.299	.105(.181)	.541	.238(.145)	.095
Access to sources	.048(.051)	.447	-.065(.071)	.500	.090(.078)	.799	-.026(.089)	.809	-.125(.125)	.319	-.117(.100)	.259
Participation in PLC	.203(.063)	.041	.128(.088)	.141	.136(.093)	.164	.224(.105)	.018	.156(.156)	.174	.207(.125)	.030
Competences	.287(.075)	.009	.025(.105)	.792	.047(.105)	.662	.019(.120)	.850	.169(.170)	.174	.140(.137)	.173
Motivation	.351(.062)	.001	.110(.087)	.245	.542(.078)	<.001	.318(.089)	.002	.271(.129)	.062	.222(.103)	.065
Teaching experience	-.019(.037)	.843	.089(.052)	.286	.019(.057)	.193	.179(.064)	.055	-.022(.096)	.850	.077(.077)	.414
Model information	F (13, 74) = 4.49 p < .001, R ² = .441		F (13, 74) = 7.32 p < .001, R ² = .562		F (13, 74) = 4.19 p < .001, R ² = .314		F (13, 74) = 5.21 p < .001, R ² = .478		F (13, 74) = 2.18 p = .019, R ² = .276		F (13, 74) = 5.87 p < .001, R ² = .508	

Note: Significant p-values (≤.05) are reported in bold type.

Table 6
Regression analysis of individual and organisation factors (regular teachers).

Factors	Systematic reflection C		Systematic reflection S		Using research C		Using research S		Conducting research C		Conducting research S	
	<i>b</i> (s.e.)	<i>p</i>										
Time	.041(.048)	.753	.168(.068)	.081	.108(.083)	.218	.076(.094)	.457	.296(.097)	.005	.268(.099)	.007
Motivation of the team	.077(.061)	.559	-.030(.086)	.759	-.139(.080)	.191	-.052(.098)	.639	-.032(.102)	.782	.047(.106)	.669
School leader	-.033(.052)	.796	.217(.073)	.024	-.039(.066)	.731	.061(.078)	.581	.174(.087)	.169	.196(.090)	.104
Ownership	.093(.055)	.393	.095(.078)	.237	.018(.076)	.857	.108(.089)	.281	.045(.095)	.617	.160(.098)	.112
Collaboration	.087(.077)	.604	.227(.108)	.036	-.106(.108)	.406	-.114(.127)	.359	-.048(.121)	.678	.021(.125)	.845
Support of colleagues	-.122(.068)	.401	.096(.096)	.373	.013(.094)	.914	.123(.111)	.312	-.084(.108)	.467	-.073(.111)	.505
Supportive Structure	-.078(.045)	.510	-.009(.064)	.918	-.071(.069)	.520	-.034(.081)	.756	.022(.072)	.831	.060(.074)	.539
Support on inquiry-based working	-.052(.053)	.674	.042(.074)	.644	.110(.085)	.350	.184(.100)	.110	.156(.091)	.143	.045(.093)	.657
Access to sources	.085(.055)	.433	.192(.077)	.018	.325(.077)	.001	.314(.091)	.001	.085(.089)	.339	.013(.092)	.875
Participation in PLC	-.022(.069)	.826	-.019(.097)	.798	.001(.099)	.993	-.125(.116)	.146	-.036(.122)	.681	-.019(.125)	.816
Competences	.125(.069)	.267	-.029(.096)	.724	.195(.077)	.040	-.002(.091)	.986	.117(.092)	.186	-.077(.095)	.361
Motivation	.243(.060)	.047	.080(.084)	.375	.280(.082)	.010	.268(.097)	.011	.176(.089)	.092	.211(.091)	.035
Teaching experience	.082(.040)	.410	.227(.056)	.003	.227(.058)	.013	.205(.069)	.021	.117(.066)	.156	.161(.068)	.043
Model information	<i>F</i> (13, 98) = .165 <i>p</i> < .084, <i>R</i> ² = .180		<i>F</i> (13, 98) = 9.22 <i>p</i> < .001, <i>R</i> ² = .550		<i>F</i> (13, 74) = 4.69 <i>p</i> < .001, <i>R</i> ² = .384		<i>F</i> (13, 98) = 5.27 <i>p</i> < .001, <i>R</i> ² = .412		<i>F</i> (13, 98) = 6.36 <i>p</i> < .001, <i>R</i> ² = .458		<i>F</i> (13, 98) = 7.73 <i>p</i> < .001, <i>R</i> ² = .507	

Note: Significant *p*-values ($\leq .05$) are reported in bold type.

4. Conclusion and discussion

The aim of this study was to obtain insight into the extent to which academic teachers and regular teachers were involved in inquiry-based working in the first years after graduation. Previous studies on this topic were often small scale studies focussing on the graduates of one specific research-intensive teacher education programme (Davis et al., 2018; Hulse & Hulme, 2012; Schulz & Mandzuk, 2005). Furthermore, most studies were aimed at attitudes or identities related to inquiry-based working instead of teachers' actual involvement in inquiry-based activities (Dunn et al., 2008; Goodnough, 2011; Van der Linden et al., 2012). In this study, the graduates of academic and professional teacher education programmes were compared by using a self-developed questionnaire focussing on graduates' involvement in inquiry-based working. The instrument appeared to be useful for measuring the involvement of teachers in different types of inquiry-based working (1) using systematic reflection, 2) using research and 3) conducting research) and on two different levels (in the classroom and at the school level).

The results of this study showed that beginning academic teachers, compared to beginning regular teachers, were more involved in using research in the classroom. However, there were no differences between regular and academic teachers in the other forms of inquiry-based working (research question 1). Furthermore, the results showed that academic teachers were less positive about factors as time, support and motivation of their team to conduct research and the access to sources in comparison with regular teachers (organisational factors), but they rated their competencies for all forms of inquiry-based working (individual factor) higher than regular teachers (research question 2). Finally, the results showed that some factors are specifically related to the involvement in inquiry-based working of academic teachers whereas other factors are related to regular teachers (research question 3). For example, for regular teachers the years of experience appeared to be related to several forms of inquiry-based working; these teachers are more involved in inquiry-based working when they have more teaching experience. For the academic teachers, a role in a PLC had a positive effect on their involvement in inquiry-based working.

The results of this study suggest that academic teachers do not seem to get the opportunity to use all their competencies in practice; although they rated their competencies for all forms of inquiry-based working higher than regular teachers, they were

only more involved in one form (using research in the classroom). A possible explanation can be found at the school organisational level; school factors affect the extent to which teachers can apply, use and further develop the research competencies that they acquired during their teacher training (Willegems et al., 2017). In this study, both groups of teachers were quite critical about the availability of the school organisational factors support, time, access to sources and motivation of their team to conduct research. Academic teachers were even more critical than regular teachers. Either these factors were actually less present in the schools of the academic teachers or these teachers are more aware of their absence.

These insights might be useful for school organisations in supporting the professional development of academic teachers. School leaders should be aware of the competencies of the academic teachers and should try to create and maintain factors on the school organisational level in order to stimulate their development. This study gives insight in what kind of factors are relevant for academic (and regular) teachers. For instance, for academic teachers it appeared to be important to have a more formal position in their school organisation (for example in a PLC) which provides them the opportunity to use their competencies for inquiry-based working.

The results of this study are also relevant for teacher education programmes. The present study showed that motivation of teachers for inquiry-based working had an influence on several forms of inquiry-based working. Teacher education programmes can motivate teachers for inquiry-based working by integrating research projects in the complete curriculum or by connecting research project to the education practices of student teachers (Gray, 2013; Maaranen & Krokfors, 2008; Niemi & Nevgi, 2014).

This study had some limitations. The questionnaire appeared to be useful in measuring teachers' involvement in inquiry-based working, but it needs to be improved. The CFI value of 0.90 was under the value of 0.95, which was mentioned as acceptable by Hu and Bentler (1999). However, according to other literature, a value of CFI 0.90 is acceptable (Brown, 2006; Cheung & Rensvold, 2002; Lewis, 2017). Furthermore, the internal consistency in the systematic reflection in the classroom scale appeared to be rather low. This is possibly caused by the distribution of the scores in this scale; the scores were relatively high, and the variation was small, indicating that the included items might be common for most teachers. For further research using this questionnaire it is recommended to critically evaluate the items in the reflection classroom scale. This scale might be improved by focussing even more on systematic

aspects in reflection, thus focussing more on aspects that may not be daily practice for all teachers (LaBoskey & Richert, 2015). Another important issue to be mentioned is that the graduates in this study were not randomly distributed over the professional and the academic programmes. Students may therefore already have differed in their inquiry-oriented attitude before the start of their studies. However, the aim of this study was not to attribute differences between the involvement in inquiry-based working of teachers from the two types of programmes to their earlier teacher education. The focus was on what graduates actually do with their acquired research competencies once they are working as teachers in a school and which factors influence this. Furthermore, the participants in this study were graduates of 6 different regular programmes and 6 different academic programmes. We were not able, however to find elements in the curriculum of the different programmes that might contribute to the teachers' involvement in inquiry-based working.

Despite these limitations, our study provided insight into the involvement of beginning teachers in inquiry-based working. This study can be useful for schools and for teacher education programmes that want to stimulate the involvement of teachers in inquiry-based working. More and more programmes in teacher education describe themselves as 'research-based'. Preparing candidates for inquiry-based working is an aspect that many programmes aim for. The instruments in this paper try to operationalise what inquiry-based working means and may help teacher education programmes and school organisations evaluate how well they succeed in this aim. With the questionnaire we developed, we now have an instrument that enables us to investigate teachers' involvement in inquiry-based working more systematically and on a larger scale. This study is the first step in understanding how the competencies of academic teachers can be optimally used in their schools.

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