University of Groningen

Ready for take-off? The relation between teaching behavior and teaching experience of Dutch beginning primary school teachers with different educational backgrounds

Dijkema, S.; Doolaard, S.; Ritzema, E. S.; Bosker, R. J.

Published in:
Teaching and Teacher Education

DOI:
[10.1016/j.tate.2019.102914](https://doi.org/10.1016/j.tate.2019.102914)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2019

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Dijkema, S., Doolaard, S., Ritzema, E. S., & Bosker, R. J. (2019). Ready for take-off? The relation between teaching behavior and teaching experience of Dutch beginning primary school teachers with different educational backgrounds. *Teaching and Teacher Education*, 86, 1-13. [102914].
<https://doi.org/10.1016/j.tate.2019.102914>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Ready for take-off? The relation between teaching behavior and teaching experience of Dutch beginning primary school teachers with different educational backgrounds

S. Dijkema*, S. Doolaard, E.S. Ritzema, R.J. Bosker

Groningen Institute for Educational Research, University of Groningen, Grote Rozenstraat 3, 9712TG, Groningen, the Netherlands

HIGHLIGHTS

- The relation between teaching experience and teaching behavior was explored.
- This relation was compared for teachers with different educational backgrounds.
- Both groups of teachers possessed sufficient levels of teaching behavior.
- Teacher education was significantly related to the development of teaching behavior of academic teachers.
- Exploratory analysis show that the level in secondary education might play a role.

ARTICLE INFO

Article history:

Received 26 February 2018

Received in revised form

2 May 2019

Accepted 19 August 2019

Available online 6 September 2019

Keywords:

Teacher education

Teaching behavior

Teaching experience

Primary education

ABSTRACT

In this study we explored the relation between the teaching behavior and teaching experience of beginning Dutch primary school teachers with different educational backgrounds. Two groups of teachers were compared: 1) primary teachers who followed a higher professional teacher education program ($N = 46$) and 2) primary teachers who followed an academic teacher education program ($N = 55$). Multilevel growth curve modeling showed that academic teachers, on average, show faster development in their teaching behavior than higher professional teachers. Prior differences in the diplomas held by teachers in secondary education were explored as a possible explanation for this difference.

© 2019 Elsevier Ltd. All rights reserved.

It is widely acknowledged that teachers differ in their teaching behavior and that, therefore, the students of some teachers have better results than those of other teachers (e.g., Panayiotou et al., 2014; Seidel & Shavelson, 2007). The best teachers show effective teaching behavior like effective classroom management and classroom organization, give positive feedback, and differentiate. In this respect, some teachers seem to be more effective than others. In the current study we focused on observable teaching behavior during classroom instruction.

As it takes time for (beginning) teachers to develop effective teaching behavior, it is important that they are sufficiently prepared when they enter the teaching profession. In the Netherlands, next

to the existing higher professional teacher training program, a new academic teacher training program was introduced in 2008. This new program has a more research-oriented focus than the pre-existing one. Establishing this new degree resulted in teachers with different educational backgrounds working in the field. The aim of this study was to investigate whether the relation between teaching experience and teaching behavior differs for teachers with different educational backgrounds, by comparing beginning primary school teachers with different educational backgrounds in the Netherlands.

1. Teaching behavior

What constitutes effective teaching behavior has frequently been examined by investigating the impact of teaching behavior on student outcomes (e.g., Scheerens, 2016; Seidel & Shavelson, 2007). According to these findings, teachers should provide clear

* Corresponding author.

E-mail addresses: s.dijkema@rug.nl (S. Dijkema), s.doolaard@rug.nl (S. Doolaard), e.s.ritzema@rug.nl (E.S. Ritzema), r.j.bosker@rug.nl (R.J. Bosker).

instruction (e.g., Scheerens, 2016; Van de Grift, Van der Wal, & Torenbeek, 2011), teach learning strategies (e.g., Scheerens, 2016; Van de Grift et al., 2011), create a safe and orderly learning climate (e.g., Panayiotou et al., 2014; Seidel & Shavelson, 2007), provide opportunities to learn (e.g., Harbour, Evanovich, Sweigart, & Hughes, 2015; Seidel & Shavelson, 2007), differentiate (e.g., Kyriakides, Campbell, & Christofidou, 2002; Van de Grift et al., 2011), convey high expectations to students (e.g., Stronge, Ward, & Grant, 2011), and give positive feedback (e.g., Harbour et al., 2015; Kyriakides et al., 2002).

Some studies distinguish between basic and complex teaching behavior. For example, Kyriakides, Creemers, and Antoniou (2009) investigated the impact of teaching behavior on student outcomes. The results demonstrated that teachers showing more complex teaching behavior, such as differentiation, more positively influenced students' affective and cognitive outcomes. Similarly, the Dutch Educational Inspectorate (2012) distinguished basic teaching behavior, such as giving clear instruction, creating a task-oriented learning environment, and engaging students, and complex teaching behavior, such as differentiation and systematically analyzing students' progress. According to Van de Grift, Helms-Lorenz, and Maulana (2014) and Van de Grift et al. (2011), teachers first need to be able to create a safe and stimulating learning climate before they can show efficient classroom management skills and give clear instruction. As soon as teachers master this basic teaching behavior, they are competent enough to show more complex behavior such as giving differentiated instruction and teaching learning strategies.

2. Teacher education and student outcomes

A possible way of influencing teaching behavior is through the teacher training program, in which teachers are expected to learn teaching skills and put them into practice. In research on teacher education and outcomes, various measures have been used to refer to teachers' educational background, such as completed degree or certification. In this perspective, certification is earned after finishing a course in a specific subject, while more general education is needed to earn a degree. Cochran-Smith, Cannady, McEachern, Viesca, and Piazza (2012) concluded in their review that relatively few studies about the impact of teachers' education on various student and teacher outcomes have been conducted. In the studies reviewed, outcomes are often defined as teaching behavior or student achievement.

Although it is generally believed that teachers' background qualifications impact on student learning, research outcomes in primary education on the impact of teachers' educational level on students' learning achievement are still inconclusive (e.g., Early et al., 2007; Wayne & Youngs, 2003). Some studies found direct effects of teacher education on student outcomes (Boyd, Goldhaber, Lankford, & Wydruff, 2007; Cadima, Peixoto, & Leal, 2014; Castle et al., 2016; Trawick-Smith & Dziurgot, 2010), while others found indirect effects (Choi & Dobbs-Oates, 2016), ambiguous effects (Early et al., 2007; Good et al., 2006; Palardy & Rumberger, 2008; Rice, 2003; Wayne & Youngs, 2003), or no effects at all (Boonen, Van Damme, & Onghena, 2014). Due to a shortage of studies in primary education in their review, Wayne and Youngs (2003) could not draw conclusions on the impact of teachers' degree on student outcomes in primary schools. Likewise, Rice (2003) found inconclusive evidence at the primary school level. Additionally, Bressoux, Kramarz, and Prost (2009) investigated the impact of primary school teachers' training on third-grade student outcomes in France. In the French school system, teachers start teaching before receiving training. Bressoux, Kramarz, and Post (2009) compared beginning teachers with and without prior training and found a

positive effect of teacher training on students' mathematics achievement, but not on students' reading achievement. Palardy and Rumberger (2008) investigated primary school teachers' impact on first-graders' achievement. These authors reported no effect of teachers' degree, experience, and certification on math achievement. Nevertheless, an effect of teachers' certification was found on students' reading achievement. Using the methodology and theoretical framework of Palardy and Rumberger (2008), Boonen et al. (2014) investigated primary school teachers' impact on student achievement in Flanders. They found a positive effect of teaching experience on the mathematics achievement of Flemish grade-one students, but no effects were found for teachers' prior education.

Whereas some researchers compared the educational levels of teachers, others analyzed the impact of the route to the profession on student outcomes. In secondary education, Boyd, Goldhaber, Lankford, and Wydruff (2007) compared the learning gains of students of teachers who attended a traditional graduate or undergraduate program with those of teachers who followed alternative routes to certification. The researchers found that after two years of teaching experience, only teachers who had graduated from highly selective alternative programs performed up to a level comparable with that of teachers who graduated from the traditional program. Teachers who attended these highly selective programs had attained at least a bachelor's degree before starting the program.

3. Teacher education and teaching behavior

Given the inconclusiveness of findings on the relation between teachers' educational background and student outcomes, Palardy and Rumberger (2008) and Van Veen (2011) suggest focusing on the relation between teachers' educational background and teaching quality instead. Research shows that teaching quality does have a substantial impact on students' learning outcomes (e.g., Scheerens, 2016; Seidel & Shavelson, 2007). Compared with research on teacher education and student outcomes, less research has been focused on the relation between teacher education and teaching behavior (Palardy & Rumberger, 2008). This might be due to greater difficulties with quantifying these measures, or the continuous development of teaching behavior during the career.

Palardy and Rumberger (2008) found no differences in teaching practices between teachers holding an advanced degree (master's degree or higher) and teachers without an advanced degree. However, some studies in early childhood education did find an effect on teacher-student interactions and teachers' instructional quality: teachers holding a master's degree were more likely to be involved in good-fit play interactions, seemed to be more emotionally involved, and showed a higher quality of interaction during instruction than teachers with a bachelor's degree (Cadima et al., 2014; Trawick-Smith & Dziurgot, 2010). Early et al. (2007) compared the outcomes of seven major studies on teachers' educational level in early childhood education and found no or contradictory effects of the degree held by the teacher on classroom quality.

The outcomes of the few studies investigating the relation between teacher education and teaching behavior in primary education remain inconclusive. Additionally, these studies investigated the impact of teachers' education on teaching behavior at one point in time and did not focus specifically on beginning teachers. Maulana, Helms-Lorenz, and van de Grift (2015) investigated the development of teaching behavior of beginning secondary school teachers. They found that teachers holding a master's degree showed significantly higher levels of teaching behavior than teachers in their final year of teacher training. Teaching experience

as well as teacher education might be important in developing teaching behavior in primary education (Van de Grift et al., 2011).

4. Development of teaching behavior

In order to acquire effective teaching behavior, teaching experience is important (e.g., Steffy & Wolfe, 2001; Van de Grift et al., 2011). The life-cycle model of Steffy and Wolfe (2001) distinguishes six phases, the novice, apprentice, professional, expert, distinguished, and emeritus phases, through which teachers develop their teaching behavior during their career. Teachers will keep developing through the six phases as long as they work in a learning environment in which reflection on teaching behavior has a prominent role (Steffy & Wolfe, 2001): this model describes a linear teacher development, focusing on the development of teaching behavior. Van de Grift et al. (2011) investigated the relation between the teaching experience and teaching behavior of primary school teachers. Based on a cross-sectional study of 402 German teachers, the researchers concluded that teaching experience was nonlinearly related to the teaching behavior of teachers. Nevertheless, the complexity of teaching behavior followed a hierarchical order: in the beginning of the teaching career, teachers mainly show basic teaching behavior, whereas more experienced teachers show more complex teaching behavior. Teachers just entering the teaching profession were able to create a safe and stimulating learning climate and could organize their classes sufficiently. Some of these teachers were able to give clear and structured instruction. The largest differences in teaching behavior were found between teachers just entering the field and teachers with one to five years of teaching experience. In addition to creating a safe and stimulating learning climate and sufficient classroom organization, teachers with one to five years of teaching experience were able to give clear and well-structured instruction, engage students during their lessons, monitor students' understanding of the explained curricular content, and give feedback. After ten years of teaching, experienced teachers scored just above average on teaching behavior. Some of these teachers were able to use activating teaching methods and could account for differences between students. At between eleven and twenty years of teaching experience, the growth curve flattened; after twenty years, the quality of teaching behavior gradually declined. Yet, given the cross-sectional nature of the study, this increase during the early years of the teaching career might also be caused by high career dropout rates, with the best teachers remaining in the teaching profession (Van de Grift et al., 2011).

According to Schaffer, Stringfield, and Wolfe (1992), the quality of the instruction of beginning teachers increases during the first year of the teaching career, owing especially to the development of management and organizational skills. During the second year, teachers showed an increase in time spent on instruction and explanation. In the same study, qualitative data were collected and two case studies were presented. These studies showed that during the second year of the teaching career teachers showed a broader repertoire of teaching behavior, such as asking more questions and using different instructional techniques (Schaffer et al., 1992).

Maulana et al. (2015) also found improvement in the teaching behavior of secondary school teachers during the first three years of the teaching career. Using a questionnaire based on Van de Grift's (2007) observation instrument for teaching behavior, students' perceptions of their teachers were collected during the first three years of the teaching career. According to the students' perceptions, teachers showed an increase in all six behavior domains: safe and stimulating learning climate, efficient classroom management, clear instruction, stimulating and activating lesson, differentiation, and teaching of learning strategies (Maulana et al., 2015).

5. The Dutch higher education system

Higher education in the Netherlands has two different orientations: 1) research-oriented education and 2) higher professional education (European Consortium for Accreditation, 2014). Research-oriented educational programs are offered at research-oriented universities and focus on the acquisition and use of academic knowledge and skills. Higher professional education programs are offered at universities of applied sciences and have a more practical orientation. Educational programs for primary school teachers are provided by both research-oriented universities and universities of applied sciences, but differ in implementation. An overview of the Dutch higher educational system is depicted in Fig. 1. Although the orientations of bachelor's degrees at the research-oriented universities and universities of applied science differ, the international qualification levels are similar.

5.1. Bachelor's programs preparing for the profession of primary school teacher

The quality of Dutch primary school teachers has been the subject of discussion in recent years. Two major concerns can be distinguished: 1) a shortage of primary school teachers in the near future and 2) a lack of sufficient teaching skills among primary school teachers, mainly as regards complex teaching skills (Educational Inspectorate, 2012). To address these problems, various developments have taken place in the field in the Netherlands, including the introduction of a new academic bachelor's program (Nuffic, 2015) in 2008, preparing students for the profession of primary school teacher. The aim of this program was to attract more secondary school students holding pre-university diplomas to the teaching profession and to educate teachers in a more research-oriented environment in order to improve the teaching quality of primary school teachers. Graduates obtain a double bachelor's degree, both in higher professional education and from a research-oriented university. Students entering this program generally have pre-university diplomas or a propaedeutic certificate in higher professional education. This fairly recent bachelor's degree exists next to the traditional bachelor's degree in higher professional education. The higher professional teacher training program is a four-year bachelor's degree program. Students entering this teacher training program generally have senior general secondary or senior secondary vocational diplomas (Nuffic, 2015). Only about 12% of students entering this teacher training program have pre-university diplomas (Ministry of Education, Culture, and Arts, n.d.). Both teacher training programs take four years, but the content differs. Students in the academic teacher training program mainly study the scientific literature, whereas those in the higher professional program mainly study the professional literature. Furthermore, the academic program has a strong focus on the acquisition of research skills and methodological skills. While students in both teacher training programs do several internships in primary schools, students in the academic teacher training program generally spend about 140 h (5 ECTS) less in schools than students in the higher professional program, who generally spend about 2072 h (74 ECTS) in schools during their teacher training program. The academic program is offered at six different universities, leading to some differences in the programs. Nevertheless, these institutes have a joint graduation profile describing the knowledge and skills of graduates of the academic teacher training programs. Graduates of the academic teacher training program are expected to be qualified teachers and to contribute to the development and improvement of educational practices in primary education, by integrating their scientific knowledge, practical skills, and experience (National network of

Fig. 1. Dutch educational system (based on Nuffic, 2015). The qualification levels of the different educational programs are presented in the left corner of each box and the duration of the educational program is presented in the right corner. The arrows represent the different pathways in the Dutch educational system. The bold arrows depict the intake of first-year students, from different levels in secondary education, in the academic and higher professional teacher training programs.

academic teacher training programs, n.d.). The theoretical knowledge that academic students gain during their teacher training program is expected to enable them to better reflect on different educational circumstances, which might positively impact on their teaching practices. Graduates of the academic teacher training program started working in the field in 2012.

6. The present study

One of the main purposes of developing a new academic teacher training program was to produce teachers who could integrate their scientific knowledge, practical knowledge, and experience not only to contribute to the development and improvement of teaching and educational practices in primary schools, but also to develop and improve their own teaching behavior. Although it is expected that the academic teacher training program can enhance teaching behavior in primary education, research into the relation between teacher education and teaching behavior in primary education is scarce and inconclusive. Additionally, studies comparing alternative and traditional routes have often included different preparation programs, in which teachers entered the teaching profession from the start (e.g., Bressoux et al., 2009) or after following a short course (e.g., Boyd, Goldhaber, Lankford, & Wydroff, 2007), or they did not compare teaching training programs with similar international qualification levels nor consider the relation between teaching behavior and teaching experience.

Therefore, an exploration of the teaching behavior of this new group of teachers was conducted in the current study: we compared the relation between the teaching behavior and teaching experience of beginning primary school teachers who had followed a higher professional teacher training program and beginning primary school teachers who had followed an academic teacher training program. The following research question was investigated:

To what extent does the relation between teaching behavior and teaching experience differ for Dutch primary school teachers who followed a higher professional teacher training program and those who followed an academic teacher training program?

Since the prior level of secondary education of students entering the higher professional teacher training program differs from that of students entering the academic program, we also conducted preliminary analyses to explore whether there were any indications that the differences in the level of secondary education could have had an impact on any differences in the relation between teaching behavior and teaching experience.

7. Method

7.1. Participants

The teachers who participated in the study were working in kindergarten and grades 1 to 6. Table 1 presents the numbers of

Table 1
Numbers of teachers in the three cohorts ($N_{\text{observations}} = 149$, $N_{\text{teachers}} = 101$).

		2015	2016	2017
Cohort 1	Academic Teachers	9	9	6
	Final-year in-service teachers	9	9	6
		0	0	0
Cohort 2	Higher professional Teachers	14	13	8
	Final-year in-service teachers	14	13	8
		0	0	0
Cohort 3	Academic Teachers		37	7
	Final-year in-service teachers		13	7
			24	0
Cohort 3	Higher professional Teachers		26	5
	Final-year in-service teachers		11	5
			15	0
Cohort 3	Academic Teachers			9
	Final-year in-service teachers			0
				9
Cohort 3	Higher professional Teachers			6
	Final-year in-service teachers			1
				5
Total		23	85	41

teachers across the different cohorts. Of the 101 teachers ($N_{\text{male}} = 12$) that participated in this study, 48 were working as teachers in primary education and 53 were final-year in-service teachers. These final-year in-service teachers were graduates in their last three months of the final internship of the teacher training program. Teachers were observed once, twice, or thrice in this study; 13 teachers were observed three times, 22 teachers were observed twice, and 66 teachers were observed once. Teaching experience was measured in months, starting from the moment of graduation. The teaching experience of final-year in-service teachers was calculated by subtracting the required number of months before completing the internship from zero. This means that these teachers had a negative value for teaching experience. The final-year in-service teachers of the academic training program had an average teaching experience of -2.24 ($SD = 0.66$) months, ranging from -3 to -1 months. The average teaching experience of the final-year in-service teachers of the higher professional program varied from -3 to -1 months, with an average teaching experience of -2.25 ($SD = 0.64$) months. Teachers who followed the academic program had teaching experience varying from 6 to 51 months, with an average of 23.02 ($SD = 11.93$). Teachers who followed the higher professional program had an average experience of 29.23 months ($SD = 12.34$), with a range of 7–54 months. The two groups of teachers differed significantly in their average number of months of teaching experience ($t(94) = 2.41$, $p < .05$), with teachers from the academic program having almost six months less teaching experience on average than teachers from the higher professional program.

7.2. Procedure

Teachers were invited by email to participate in the study. In 2015 we approached 226 (about 90%) graduates of the academic program from five universities¹ in the Netherlands, who graduated in the period 2012–2014. The Dutch academic teacher training program is offered at six universities. One university did not participate for practical reasons. Likewise, 1270 (12.5%) of the

graduates of higher professional education² who graduated in the period 2012–2014 were approached. Of these teachers, 23 (1.5%) were willing to participate in the study and met the criterion of working at least 16 h a week in the same class. Informed consent forms were signed by the teachers and school principals and returned to the research team.

In 2016, we approached 362 (about 90%) of the graduates of the academic program from five universities³ in the Netherlands, who graduated in the period 2012–2015. Likewise, 1519 (11.6%) of the graduates of higher professional education² who graduated in the period 2012–2015 were approached. The research team tried to contact the teachers first by email, then using social media, like Facebook and LinkedIn. Members of the research team called teachers if a telephone number was available. Twenty-four teachers (1.3%) participated in the study, having returned signed consent forms to the research team. Additionally, 22 teachers who had participated in 2015, participated again in 2016. Furthermore, final-year in-service teachers⁴ were approached during supervision meetings at their educational institutes and asked to participate in the study: 39 were willing to do so.

In 2017, we asked the teachers who participated in 2016 to participate in the study once more. They were contacted by email and phone; 26 teachers agreed to participate. For practical reasons, only graduates of the Hanze university of applied sciences and the university X were approached by email. One teacher returned a signed consent form to the research team and participated in the study. Furthermore, final-year in-service teachers⁵ were asked to participate in the study. Like in 2016, these teachers were contacted during supervision meetings at their educational institutes: 14 were willing to participate.

The participating teachers were asked to complete an online questionnaire, via Qualtrics survey software, about their prior education and working experience. After they had returned the consent form and completed the online questionnaire, an appointment for the classroom observation was made.

Classroom observations were conducted in spring 2015, 2016, and 2017 during language or math classes. An average lesson took about 1 h and included instruction given by the teacher, processing of the study materials, and lesson closure.

Since the participation rate was low, we investigated whether the teachers participating over the three years of this study differed from teachers who completed the questionnaire but could not participate in the study. When recruiting teachers to participate in the study, we sent an online survey by email. This questionnaire was completed by teachers who participated in the study ($N = 50$), but also by a group of teachers who decided not to participate ($N = 524$). As the final-year in-service teachers were approached at their educational institute, they did not complete the questionnaire. We collected information about age, teaching experience, working hours, gender, level of secondary education, and subsequent education. With respect to these factors, participating teachers and non-participating teachers differed only in the level of secondary education obtained (Table 2). A reason for this might be that the percentage of teachers in this study who followed an

² Hanze University of Applied Sciences, NHL University of Applied Sciences, Stenden University of Applied Sciences, University of Applied Sciences Utrecht, and University of Applied Sciences Leiden.

³ Leiden University, Radboud University Nijmegen, University of Amsterdam, University of Groningen, and Utrecht University.

⁴ University of Groningen, Utrecht University, University of Applied Sciences Utrecht, Hanze University of Applied Sciences, Stenden University of Applied Sciences.

⁵ University of Groningen, Hanze University of Applied Sciences, Stenden University of Applied Sciences.

¹ Leiden University, VU University Amsterdam, University of Amsterdam, University of Groningen, and Utrecht University.

Table 2

Frequencies and descriptives of background variables of teachers participating in the study (N = 50) and non-participating teachers (N = 524).

		Participating teachers	Non-participating teachers	
Teacher education	Higher professional	27	100	
	Academic	23	28	
	Unknown	0	396	
Age		24.38 (2.34)	25.08 (4.01)	$t = 1.16, df = 171, p = .25$
Teaching experience	In months	16.54 (10.09)	14.67 (11.38)	$t = -1.01, df = 170, p = .31$
Working hours factor		31.48 (8.87)	31.69 (10.45)	$t = .21, df = 133, p = .90$
Gender	Male	8	20	$\chi^2 = .01, df = 1, p = .94$
	Female	42	109	
	Unknown	0	395	
Diploma secondary education	Senior secondary vocational education	8	30	$\chi^2 = 9.82, df = 2, p = .01$
	Senior general secondary education	12	54	
	University preparatory education	30	44	
	Unknown	0	396	
Subsequent education	None	34	91	$\chi^2 = 4.59, df = 2, p = .10$
	Master (higher professional education)	4	18	
	Master's degree (university)	12	15	
	Unknown	0	400	

academic teacher training program (46%) was higher than the percentage of academic teachers in the entire group of teachers (28%) that was approached to participate in this study. Since the number of teachers in the non-participating group is also not high, this comparison can only give an indication of differences between the teachers participating in this study and teachers in general.

We investigated whether the number of observations was related to the observed level of teaching behavior, controlling for differences in teaching experience, and we investigated whether this relationship differed for teachers who followed an academic or higher professional teacher training program. The number of classroom observations was related to the level of teaching behavior when teachers with one or two observations ($F(1, 67) = 4.704, p < .05$) were compared and when teachers with one or three observations ($F(1, 59) = 4.469, p < .05$) were compared, but not when teachers with two or three observations ($F(1, 29) = 0.516, p = .48$) were compared. However, this relation between the number of classroom observations and teaching behavior did not differ significantly for the two groups of teachers when teachers with one or two observations ($F(1, 67) = 0.310, p = .58$), one or three observations ($F(1, 59) = 0.258, p = .61$), or two or three observations ($F(1, 29) = 0.719, p = .40$) were compared.

7.3. Instruments

7.3.1. Teaching behavior

The International Comparative Analysis of Learning and Teaching (ICALT) instrument was used to measure teaching behavior. This validated instrument (Van de Grift, 2007) consists of 24 items measuring six constructs: safe and stimulating learning climate, efficient classroom management, clear instruction, stimulating and activating lesson, differentiation, and teaching of learning strategies. All items were scored on a four-point Likert scale: 1) weak, 2) more weak than strong, 3) more strong than weak, 4) strong. Van de Grift et al. (2011) constructed a Rasch model, in which the unidimensionality of the ICALT instrument was tested. The 24 items of the ICALT instrument are hierarchically ordered, from basic teaching behavior to more complex teaching behavior. The ICALT scores that were given during classroom observations were dichotomized for the 24 items included in the Rasch model. A score of 1 or 2 was recoded into 0 and a score of 3 or 4 was recoded into 1. The sum score of these dichotomized scores was used in this study.

The reliability and validity of the current study's ICALT scores were tested before the analysis was conducted. The Cronbach's

alpha of the scale was $\alpha = 0.89$, which can be interpreted as a good internal consistency of the scale. Following the procedure of, for example, Van de Grift et al. (2014), correlations between the sum score and students' engagement were measured to test the predictive validity of the instrument. Students' engagement was measured during the classroom observation using the ICALT instrument developed by Van de Grift (2007). The construct consisted of three items focusing on students' behavioral and psychological engagement; this was scored on the same four-point Likert scale as the other constructs (Van de Grift et al., 2014). The Cronbach's alpha of the scale was $\alpha = 0.78$, which can be interpreted as an acceptable internal consistency of the scale. The Pearson's r correlation was $r = 0.65$, indicating a strong positive relationship between the teaching behavior and students' engagement.

7.3.2. Interrater reliability

The classroom observations were conducted by eleven trained observers. These observers followed a one-day face-to face course and an additional online training course using video material. Since the classroom observations were conducted from 2015 to 2017, before the start of the observation periods in 2016 and 2017, the observers followed another one-day face-to-face training course. The observers had experience working as primary school teachers or had bachelor's or master's degrees in educational sciences. After training, the interrater reliability was measured using Kappa for multiple raters. The observers obtained a moderate (2015) to good (2016 & 2017) agreement of $K = 0.49$ (2015), $K = 0.62$ (2016), and $K = 0.63$ (2017) (Fleiss, Levin, & Paik, 2003).

7.3.3. Personal characteristics

Measures concerning the personal characteristics of the teachers were gender, teaching experience, level of secondary education, and obtained bachelor's degree in teacher education. These variables were assessed using an online questionnaire, via Qualtrics Survey Software, which was completed by the teachers at the beginning of the study. The covariate gender was used in constructing the covariate model, the obtained bachelor's degree in teacher education and the diploma held by teachers in secondary education were used as explanatory variables in the estimated models, and teaching experience was used as a time component in both models to represent the development of the two groups of teachers in teaching behavior.

7.3.4. Teaching experience

As described above, teaching experience was measured by counting months of teaching experience after graduation from the teacher training program. The in-service teachers who participated in this study were finishing their final internship of the teacher training program.

7.3.5. Diploma in secondary education

The diplomas that the teachers had obtained in secondary education could be scored as: 1) pre-university diploma ($N_{teachers} = 92$), 2) senior general secondary diploma ($N_{teachers} = 27$), or 3) preparatory secondary vocational diploma ($N_{teachers} = 16$), or unknown ($N_{teachers} = 14$).

7.3.6. Teacher education

Teacher education refers to the teacher training program that was followed by the teacher, scored as 1) the higher professional teacher training program ($N_{teachers} = 77$) or 2) the academic teacher training program ($N_{teachers} = 72$).

7.3.7. Contextual characteristics

Contextual variables referring to classroom characteristics were included: time of observation, multigrade class, grade, number of students, and subject of the lesson. These variables were obtained during the classroom observation and reported by the observers on the observation form. These covariates were also used in constructing the covariate model.

7.3.8. Time of observation

The time of classroom observation was scored in four different timeslots: 1) beginning of the morning ($N_{observations} = 77$), 2) end of the morning ($N_{observations} = 44$), 3) beginning of the afternoon ($N_{observations} = 14$), and 4) end of the afternoon ($N_{observations} = 2$). To control for differences between classroom observation in the morning and the afternoon (e.g., Klein, 2004), a covariate was added to the model.

7.3.9. Multigrade classes

Teachers of multigrade classes face additional challenges in their classroom instruction (Veenman & Raemaekers, 1995). A covariate was added to the model to control for possible differences between single grade and multigrade classes. Multigrade classes consisted of two or three grades being taught in one class. In the analysis, a dichotomized variable was added to control for differences between single grade, coded as zero ($N_{observations} = 42$), and multigrade classes, coded as one ($N_{observations} = 107$).

7.3.10. Grade

In the Dutch educational system, primary education includes both kindergarten (children aged 4 to 6) and grades one to six (children aged 7–12). The classroom instruction in kindergarten might differ from that in the higher grades (Uibu, Kikas, & Tropp, 2011). A covariate was added to the model to control for possible differences. The grade was dichotomized during the analyses: kindergarten ($N_{observations} = 25$) was scored as zero and grades one to six ($N_{observations} = 124$) were scored as one.

7.3.11. Subject of the lesson

In Dutch primary education, complex teaching behavior, especially classroom differentiation, is more common during math and Dutch language lessons. In order to give teachers equal opportunities to show these complex teaching skills, we specifically requested a math or Dutch language lesson. Teachers could choose their lesson of preference, but teachers who were observed two or three times were asked to give a lesson in the same subject as the

first classroom observation. According to the Dutch Educational Inspectorate (2010), more complex teaching behavior, such as classroom differentiation, is more frequently used during math lessons than Dutch language lessons. To control for possible differences we added a covariate to the model. The subject of the lesson during the observation was scored as zero for a Dutch language class ($N_{observations} = 49$) and one for a math class ($N_{observations} = 95$).

8. Analysis

After computing the descriptive statistics, we estimated a multilevel growth curve model in MLwiN (Charlton, Rasbash, Browne, Healy, & Cameron, 2017) to represent the relation between the teaching experience and the teaching behavior of the beginning teachers from the two teacher training programs during the early months of their teaching careers. Since we did not investigate the individual development of primary school teachers, but differences between two groups of teachers, the classroom observations of the academic and the higher professional teachers were grouped to estimate two different growth curves. We used maximum likelihood estimations in which all the classroom observations of teachers gave information about the shape of the growth curves. Teachers with three classroom observations provided more information about the curve than teachers with two classroom observations; and teachers with two classroom observations provided more information than teachers with only one classroom observation (Little & Rubin, 1987). According to Snijders and Bosker (2012), it is not problematic when teachers only contribute with one observation moment, as long as the number of observations available is not informative about the process being investigated, which in this case implies that for teachers with fewer observations the relation between experience and teaching behavior is not differing from that relation for teachers for which there are more observations.

First, normality and homoscedasticity assumptions were checked using a plot of standardized residuals against the normal score and a plot of standardized residuals against teaching experience. Both assumptions were adequately met; the first plot represented an approximately straight line at both levels, and the second plot represented no evident relation between the variance of the residuals and teaching experience.

A two-level model was used to account for the hierarchical structure of the data; observations (level 1) were nested within teachers (level 2). The models were estimated using maximum likelihood estimation. Using a stepwise approach, different models were tested to find the model that fitted the data best. First, linear and polynomial components were added to the model. Covariates were then added to the model using a forward approach: variables were added one by one and tested for whether they made a significant contribution to the model fit. If a variable did not make a significant contribution (with α set at <0.05), it was removed from the model. If a covariate made a significant contribution to the model fit, the effect of an interaction component (covariate * teaching experience) was also tested to determine whether the significant difference was also present in the growth curve. Finally, the explanatory variable (teacher education) was added to the model, in order to identify differences between the two groups of teachers. An interaction component (teacher education * teaching experience) was added to account for an effect in the growth curve. The final model consisted only of fixed effects and was significant ($p < .05$). A similar approach was used in the preliminary analyses to explore differences between teachers based on prior diplomas in secondary education. Three groups of teachers were distinguished in this model.

9. Results

Table 3 gives an overview of the average sum scores of the teaching behavior of teachers who followed the academic teacher training program and teachers who followed the higher professional teacher training program per year of teaching experience. Of the 149 classroom observations, 77 were conducted in classrooms of academic teachers ($N = 44$) and academic final-year in-service teachers ($N = 33$). A total of 72 observations took place in classrooms of higher professional teachers ($N = 52$) and higher professional final-year in-service teachers ($N = 20$). The descriptive statistics depicted in Table 3 include classroom observations over the three measurement points (2015, 2016, and 2017).

The 149 scores were arranged according to teaching experience for both academic and higher professional teachers. Since the number of classroom observations varied from one to three, the observations were added at level 1 in the multilevel analysis. The growth curves were predicted based on teaching experience at the moment that the classroom observation was conducted.

9.1. The relation between teaching experience and teaching behavior of academic and higher professional teachers

To estimate whether the teaching behavior of teachers was related to teaching experience, an empty model was first fitted to the data (Table 4). Next, the optimal functional form was identified,

Table 3
Descriptive statistics of the teaching behavior of academic and higher professional teachers arranged by teaching experience ($N_{\text{observations}} = 149$, $N_{\text{teachers}} = 101$).

Teacher education	Teaching experience	Teaching behavior				
		N	M	SD	Min	Max
Academic program ($N = 77$)	–3 – 0 months	33	15.21	3.91	7	23
	1–12 months	11	15.45	4.01	6	20
	13–24 months	16	17.19	4.56	9	24
	25–36 months	11	18.36	5.28	6	24
	37–48 months	5	18.40	3.51	14	23
Higher professional program ($N = 72$)	49–60 months	1	15.00			
	–3 – 0 months	20	16.95	3.46	10	22
	1–12 months	6	17.50	2.67	15	22
	13–24 months	14	14.14	4.59	6	20
	25–36 months	17	16.24	4.92	6	24
	37–48 months	9	17.33	3.91	11	22
	49–60 months	6	19.00	2.10	17	22

Table 4
Multilevel analyses predicting teaching behavior of academic and higher professional teachers ($N_{\text{observations}} = 149$, $N_{\text{teachers}} = 101$).

	Empty model		Model 1		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE
Response: teaching behavior								
<i>Fixed part</i>								
Intercept	16.24	0.384	15.060	0.500	12.777	1.266	13.886	1.295
Teaching experience			–0.266	0.096**	–0.258	0.095	–0.316	0.092**
Teaching experience ²			0.017	0.005**	0.017	0.005*	0.017	0.005**
Teaching experience ^{3a}			–0.000	0.000**	–0.000	0.000*	–0.000	0.000**
Gender					2.500	1.271*	2.163	1.268
Teacher education (higher professional = reference)							–1.189	0.958
Teacher education * teaching experience							0.123	0.040**
<i>Random part</i>								
Teacher level	6.560	2.518	13.690	2.592	13.189	2.515	12.409	2.320
Measurement level	11.214	2.172	5.001	1.008	5.003	1.018	4.378	0.891
–2*loglikelihood	842.615		815.654		811.763		802.579	
Number of teachers	101		101		101		101	
Number of measures	149		149		149		149	

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

^a The fixed effect of teaching experience is extremely small (close to zero); due to the restriction of 3 digits after the decimal point, the values equal zero in the model. The exact score for Teaching experience³ is $\beta = -0.0002$ ($SE = 0.00007$) for models one, two, and three.

by including a linear component, a quadratic component, and a cubic component in the model. This model, Model 1, fitted the data significantly better than the empty model ($\chi^2 = 26.96$, $df = 3$, $p < .01$), and indicated that the relation between teaching experience and teaching behavior was positive and nonlinear. In the third step, Model 2 (the covariate model) was estimated. Only the significant predictor gender ($N_{\text{males}} = 12$, $N_{\text{females}} = 89$) was kept in the model ($\chi^2 = 3.89$, $df = 1$, $p < .05$). Female teachers seem to have a higher level of teaching behavior when entering their teaching career. No differences were found between men and women in the development of teaching behavior. The covariates time of observation, multigrade classes, grade, subject of the lesson, and number of students in the classroom did not contribute significantly to the model. In the third model, teacher education was added. The results presented in Table 4 show that Model 3 fitted the data significantly better than Model 2 ($\chi^2 = 9.184$, $df = 2$, $p > .05$).

The growth curves of Model 3 are depicted in Fig. 2. Teachers in the academic teacher training program did not differ significantly in their teaching behavior at the intercept: that is, when leaving the teacher training program. A significant result was found for the linear component (interaction term): on average, academic teachers showed a faster rate of development of teaching behavior than higher professional teachers during the early years of their teaching career; this is visible in the steepness of the curves.

9.2. Exploratory analyses: the relation between teaching experience and teaching behavior related to teachers' diploma in secondary education

Since teachers graduating from the two teacher training programs differ in the diplomas that they hold in secondary education, an additional model was estimated in which we controlled for prior differences in the level of secondary education. As the number of classroom observations and teachers was very small, particularly for the group of higher professional teachers holding a pre-university diploma, exploratory analyses were conducted. In the multilevel model the classroom observations of teachers from the two programs were divided into three groups according to their prior education: 1) teachers in the academic program, holding pre-university diplomas ($N_{\text{observations}} = 77$, $N_{\text{teachers}} = 55$), 2) teachers in the higher professional program holding pre-university diplomas ($N_{\text{observations}} = 15$, $N_{\text{teachers}} = 8$), and 3) teachers in the higher professional program holding senior general secondary diplomas,

Fig. 2. Growth curve of teaching behavior for academic and higher professional teachers ($N = 149$). The solid line represents the academic teachers and the dashed line the higher professional teachers.

senior secondary vocational education, or unknown ($N_{\text{observations}} = 57$, $N_{\text{teachers}} = 38$). All teachers in the academic program held pre-university diplomas; as a consequence, we could not control for differences in prior education within the academic program. The preliminary outcomes of the multilevel analyses are presented in Table 5. Model 4, with three groups based on prior level in secondary education and teacher training program, seems to fit the data better than Model 2 ($\chi^2 = 12.90$, $df = 4$, $p < .05$); this might indicate that the level that teachers followed in secondary education has an impact on the relation between teaching experience and teaching behavior. The growth curves of the three-group model are depicted in Fig. 3.

In the preliminary growth curves, teachers from the academic program holding pre-university diplomas, on average, show a faster development in their teaching behavior during the first four years of the teaching career than higher professional teachers holding diplomas in senior general secondary education or senior secondary vocational education. The higher professional teachers with pre-university diplomas differ from other higher professional teachers in their growth curves, but not significantly ($p = .06$). This nonsignificant difference might be due to the small sample size. A

Fig. 3. Growth curve of teaching behavior based on the diplomas held by teachers in secondary education and the teacher training program ($N = 149$). The dashed line represents higher professional teachers holding diplomas in senior general education, senior vocational education or unknown, the dotted line represents higher professional teachers holding pre-university diplomas and the solid line represents academic teachers holding pre-university diplomas.

contrast test was conducted to examine whether higher professional teachers holding pre-university diplomas differed from academic teachers holding pre-university diplomas. No differences were found in the intercept ($\chi^2 = 0.999$, $df = 1$, $p > .05$) and the development of the two groups of teachers ($\chi^2 = 0.001$, $df = 1$, $p > .05$). Since the number of higher professional teachers holding pre-university diplomas included in this study is small ($N = 8$), the results should be interpreted as preliminary and might give an indication of a possible explanation for the previously found differences in the developments of teaching behavior between the two groups of teachers.

10. Discussion

In the current study we explored the relation between the teaching experience and teaching behavior of beginning primary school teachers with different bachelor's degrees. Our aim was to compare the teaching behavior of beginning primary school teachers with different educational backgrounds, in the

Table 5

Multilevel analyses predicting teaching behavior of teachers based on diplomas in secondary education and teacher training program ($N_{\text{observations}} = 149$, $N_{\text{teachers}} = 101$).

	Empty model		Model 1		Model 2		Model 4	
	B	SE	B	SE	B	SE	B	SE
Response: teaching behavior								
<i>Fixed part</i>								
Intercept	16.24	0.384	15.060	0.500	12.777	1.266	14.064	1.347
Teaching experience			−0.266	0.096**	−0.258	0.095	−0.318	0.095**
Teaching experience ²			0.017	0.005**	0.017	0.005*	0.016	0.005**
Teaching experience ^{3a}			−0.000	0.000**	−0.000	0.000*	−0.000	0.000**
Gender					2.500	1.271*	2.402	1.309
Diploma in secondary education								
(1.higher professional; senior general education = reference)								
2.Higher professional; pre-university education							−3.827	2.246
3.Academic; pre-university education							−1.624	1.017
Higher professional; pre-university education*teaching experience							0.138	0.073
Academic; pre-university education* teaching experience							0.140	0.042**
<i>Random part</i>								
Teacher level	6.560	2.518	13.690	2.592	13.189	2.515	13.213	2.435
Measurement level	11.214	2.172	5.001	1.008	5.003	1.018	4.396	0.893
−2*loglikelihood	842.615		815.654		811.763		798.860	
Number of teachers	101		101		101		101	
Number of measures	149		149		149		149	

*: $p < .05$; **: $p < .01$.

^a The fixed effect of teaching experience is extremely small (close to zero); due to the restriction of 3 digits after the decimal point, the values equal zero in the model. The exact score for Teaching experience³ is $\beta = -0.0002$ ($SE = 0.00007$) for models one, two, and three.

Netherlands.

10.1. *The relation between teaching experience and teaching behavior of academic and higher professional teachers*

In previous studies, especially during the early years of the teaching career, a positive increase in teaching behavior was found (e.g., Maulana et al., 2015; Van de Grift et al., 2011). Van de Grift et al. (2011) found a positive nonlinear relation between teaching experience and the teaching behavior of teachers. The relation between the teaching behavior and teaching experience of beginning teachers in the current study was also positively nonlinear. After graduating, beginning teachers showed a gradual, though not significant, decline, which ended after around 11–12 months of teaching experience. A possible reason for this decline is that final-year in-service teachers are supervised during their internship, but after graduating they have full responsibility for their own group of students, and have to create a proper learning climate and organize the classroom efficiently on their own. Organizing a classroom efficiently can take some time, and this might be reflected in the teaching behavior of beginning teachers. Furthermore, it is possible that during the internship teachers are not assigned to the most complex classes (e.g., including children with learning disabilities or behavioral problems), in which they do need to teach after graduation. Between the 10th and the 11th month, the growth curves of the two groups of teachers cross and, in the months after this, the slope of the growth curve of the group of academic teachers shows a significantly steeper development of teaching behavior than that of the higher professional teachers. Van de Grift et al. (2011) modelled the relation between teaching experience and teaching behavior during the teaching career. They found that beginning teachers who enter the teaching profession are able to create a safe and stimulating learning climate and are able to organize their classes efficiently. Additionally, some teachers are able to give clear and structured instruction. The average level of teaching behavior that teachers demonstrated during the first four years of the teaching career in the current study was higher: in addition to creating a safe and stimulating learning climate and efficient classroom organization, most of the teachers were capable of giving clear and structured instruction when they entered the teaching profession. In the following years, the participating teachers continued to show higher levels of teaching behavior and also started to display more complex teaching skills, such as using activating teaching methods.

On average, academic teachers show higher levels of teaching behavior during the first four years of their teaching career than higher professional teachers. As the academic teacher training program has a greater focus on scientific knowledge in pedagogy and educational sciences, teachers might have more knowledge about, for example, developmental and educational psychology. This knowledge might help them to use adequate teaching methods and to adjust their lessons to the different needs of students, which is also better reflected in more complex teaching behavior, such as differentiation. Research shows that thorough knowledge about the context, about student development and effective teaching methods, contributes to effective teaching behavior (e.g., Hill, Ball, Blunk, Goffney, & Rowan, 2007; Kunter et al., 2013). Furthermore, the academic teacher training program has a research-oriented approach, in which student teachers are educated and involved in conducting scientific research. The strategies learned during this program might contribute to a broader repertoire of reflective strategies. More advanced reflective strategies might help teachers to improve their teaching practices (Ahmed & Al-Khalili, 2013). Impedovo and Khatoun Malik (2016) found that research skills and attitudes developed during a

master's degree program had a positive impact on teachers' development of reflective practices. Comparisons of beginning (less than five years of teaching experience) and more experienced teachers showed that it might take some time for teachers to incorporate these reflective practices in a systematic way into their everyday practices. Nevertheless, beginning teachers did use their reflective skills and approaches after the master's degree. That teachers need time to develop their reflective practices might explain why differences are only seen in the development of teaching behavior of the groups of teachers and not when teachers enter the teaching profession.

10.2. *Exploratory analyses: the relation between teaching experience and teaching behavior related to teachers' prior diploma in secondary education*

To explore whether differences in the relation between the teaching experience and teaching behavior of academic and higher professional teachers could be related to their prior level in secondary education, exploratory growth curves were estimated in which teachers were grouped according to diploma in secondary education and teacher training program. The exploratory outcomes show that teachers who had just graduated did not differ in their teaching behavior. Higher professional teachers holding senior secondary vocational or senior general secondary diplomas showed a positive nonlinear relation between teaching experience and their teaching behavior. However, the growth curve of the group of academic teachers holding pre-university diplomas shows a significantly steeper development of teaching behavior during the first four years of the teaching career than that of higher professional teachers holding diplomas in senior general secondary education or senior secondary vocational education. The groups of higher professional teachers holding pre-university diplomas did not differ in their development from academic teachers, nor from higher professional teachers holding senior secondary vocational or senior general secondary diplomas. In the Dutch educational system, students are divided into different levels based on their cognitive capacities. As a consequence, teachers holding pre-university diplomas have higher cognitive capacities and have also been found to have higher ambitions than students in senior general secondary education (Kuyper & Guldemon, 1997). That cognitive capacities might be important for teaching quality is also seen in, for example, Finland and Japan, where the best students are selected to enter the teaching training program (Rice, 2003). International comparative studies show that in countries where teachers are recruited based on their cognitive capacities, students also perform well. Furthermore, teachers' motivational orientations are also found to be important for teachers' development (Kunter et al., 2013). Teacher motivation is especially essential for teachers to stay in the teaching profession. Specifically, intrinsic motivation was found to be related to effective teaching behavior, which in turn impacts on the motivation of students (Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009; Kunter et al., 2008). Teachers holding pre-university diplomas could, like the vast majority of those with these diplomas, also have chosen for a scientific career, but decided to combine scientific education with the more practical orientation of higher professional education. This indicates that this group of students might be highly motivated to enter the teaching profession. Nevertheless, if these differences in cognitive capacities and ambitions accounted for the differences in teaching behavior, it remains unclear why this was reflected only in the development of the groups of teachers, and was not manifest at the end of the teacher training program or during the first year of the teaching career. Perhaps the development of basic teaching behavior requires other, more practical, skills. As soon as teachers master basic

teaching behavior and start developing more complex teaching behavior, (critical) thinking skills have a more prominent role: for example, in learning to teach learning strategies and in differentiation. Additionally, Like this study, previous studies investigating the relation between teaching experience and teaching behavior did not take into account specific experiences of teachers during the teaching career, like supervision or further education (e.g., [Van de Grift et al., 2011](#); [Schaffer et al., 1992](#)). Future research should further explore differences between these three groups of teachers.

10.3. Limitations

This study had several limitations. First, the selectivity of the sample: the number of teachers participating in this study, in both the academic program and the higher professional program, was limited. Compared with the higher professional teacher training program, the number of students in the academic program was small. In 2015, between 3500 and 4000 teachers graduated from the higher professional teacher training program ([Stamos, 2017](#)), whereas about 200 students graduate each year from the academic teacher training program ([National network of academic teacher training programs, 2018](#)). Moreover, in order to participate in this study, teachers had to work at least two days a week in the same class. Beginning teachers reported having difficulties finding a job in which they had their own class for a considerable amount of time. In addition, teachers volunteered to participate in this study, which may have caused a bias in the representativeness of the sample. Perhaps teachers who had more confidence in their teaching behavior were more willing to participate in the study. [Van de Grift et al. \(2011\)](#) used observational data from the German educational inspectorate in their study; this might explain why they found more variation in teaching behavior compared with our findings. Furthermore, dropout rates are high in the early years of the teaching career: the best teachers possibly remain in the teaching profession ([Van de Grift et al., 2011](#)). The voluntary participation and high dropout rates may be the causes of the relatively high level of teaching behavior found in this study. Since these circumstances were similar for the groups of teachers compared, they could not have influenced the differences found in the relation between the teaching experience and teaching behavior of academic and higher professional teachers.

Second, although the combination of a cross-sectional and a longitudinal approach that was used in this study was sufficient to answer the research question, the results cannot be interpreted as if it were longitudinal. For future research it could be worthwhile to investigate the development of primary school teachers using a longitudinal approach to determine how individual teachers develop and whether possible differences in development persist after four years of teaching experience.

Third, the power of the three-group model was not high. Eight higher professional teachers, for whom a different growth curve was estimated, held pre-university certificates. These preliminary results could give an indication of the effect of prior education on the level of teaching behavior during the first four years of the teaching career of academic and higher professional teachers. Since the number of higher professional teachers holding a pre-university degree is limited, the results should be interpreted with caution. In order to determine whether differences in the development of the growth curves of teaching behavior are caused by the teacher training program or by the level of prior education, additional research comparing teachers with similar educational backgrounds is needed. Because the number of students with pre-university certificates in higher professional education is small and academic students generally hold pre-university diplomas, it could be challenging to realize this.

A fourth limitation of this study is the use of a single instrument to investigate whether the teaching behavior of beginning teachers develops during the teaching career. Perhaps teaching behavior comprises more than can be observed using the ICALT instrument during a lesson or maybe some teacher behavior is not adequately reflected in the instrument. For example, the quantitative approach used in this study does not give an indication of the choices teachers made before and during the observed lesson. Perhaps teachers made certain decisions which are not reflected by the observation instrument.

10.4. Implications for policy and future research

In an attempt to improve the quality of Dutch primary school teachers, various developments have taken place in the field, including the introduction of a new academic teacher training program. The aim of developing this new bachelor's degree was 1) to train teachers in a more research-oriented environment in order to improve the teaching quality of primary school teachers and 2) to attract more secondary school students holding pre-university diplomas to the teaching profession.

The participating beginning academic and higher professional teachers showed higher levels of teaching behavior than the average level of the German teachers found by [Van de Grift et al. \(2011\)](#), which might indicate that teachers are sufficiently prepared in their teaching behavior and develop adequately during the early years of the teaching career. Nevertheless, we did find differences in the level of teaching behavior of beginning primary school teachers. Given these differences it would be advisable for induction programs to adjust to the level of teaching behavior and to the steeper development of the teachers with an academic diploma, in order to provide teachers with the support they need. On average, the group of academic teachers developed their teaching behavior faster than the higher professional teachers. The differences between academic and higher professional teachers were mainly found in complex teaching behavior. Due to a steeper positive development of teaching behavior, the group of academic teachers seem to develop complex teaching behavior faster during the first few years of the teaching career. Effective teachers do possess this (complex) teaching behavior, which positively affects student outcomes (e.g., [Scheerens, 2016](#); [Seidel & Shavelson, 2007](#)). One of the aims of developing the academic teacher training program was to improve the teaching quality of primary school teachers. When we explored the importance of the differences in the level followed in secondary education, we found that higher professional teachers holding pre-university diplomas showed a similar positive development in teaching behavior to academic teachers. Further research is needed to determine whether prior differences in secondary education indeed impact on the development of teaching behavior. In addition, future research is needed to investigate whether the higher levels of teaching behavior impact on student learning gains and whether the differences found in the development of the two groups of teachers continue to exist in the subsequent years of the teaching career. It remains unclear what factors caused the significant difference between academic and higher professional teachers. In order to improve teacher training programs it might also be interesting to gain more insight into the factors within the programs that might have a positive impact on the development of teaching behavior. Additionally, more research is needed to investigate whether more diversity in schools, in terms of teachers with different educational backgrounds, will also lead to improvement of educational quality in schools.

The other aim was to attract more students holding pre-university diplomas to the teaching profession. To address the

second aim, future research should also investigate the numbers of graduates of the academic teacher training program that stay in and leave the profession, and the possible motives for teachers' decisions. Teachers with a new educational background entering the teaching profession might lead to different expectations, for both graduates and schools, which might conflict with the culture in primary schools. Nevertheless, the academic teacher training program might contribute to the improvement of teaching behavior indirectly by attracting pre-university students to the profession who otherwise might not have chosen to enter the teaching profession.

Funding

This research was supported in part by the Netherlands Organization for Scientific Research.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tate.2019.102914>.

References

- Ahmed, E. W., & Al-Khalili, K. Y. (2013). The impact of using reflective teaching approach on developing teaching skills of primary science student teachers. *The Online Journal of New Horizons in Education*, 3(2), 58–64.
- Boonen, T., Van Damme, J., & Onghena, P. (2014). Teacher effects on student achievement in first grade: Which aspects matter most? *School Effectiveness and School Improvement*, 25(1), 126–152.
- Boyd, D., Goldhaber, D. D., Lankford, H., & Wyckoff, J. H. (2007). The effect of certification and preparation on teacher quality. *The Future of Children*, 17(1), 45–68.
- Bressoux, P., Kramarz, F., & Prost, C. (2009). Teachers' training, class size and students' outcomes: Learning form administrative forecasting mistakes. *The Economic Journal*, 119, 540–561.
- Cadima, J., Peixoto, C., & Leal, T. (2014). Observed classroom quality first grade: Associations with teacher, classroom and school characteristics. *European Journal of Psychology of Education*, 29, 139–158.
- Castle, S., Williamson, A. C., Young, E., Stubblefield, J., Laurin, D., & Pearce, N. (2016). Teacher-Child interactions in early head start classrooms: Associations with teacher characteristics. *Early Education & Development*, 27(2), 259–274.
- Charlton, C., Rasbash, J., Browne, W. J., Healy, M., & Cameron, B. (2017). *MLwiN version 3.00*. Bristol, England: Centre for Multilevel Modelling.
- Choi, J. Y., & Dobbs-Oates, J. (2016). Teacher-child relationships: Contribution of teacher and child characteristics. *Journal of Research in Childhood Education*, 30(1), 15–28.
- Cochran-Smith, M., Cannady, M., McEachern, K. P., Viesca, K., & Piazza, P. (2012). *Teachers' education and outcomes: Mapping the research terrain*. Faculty publications: Department of teaching, learning and teacher education.
- Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G. T., et al. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development*, 78(2), 558–580.
- Educational Inspectorate. (2010). *Opbrengstgericht werken in het basisonderwijs. Een onderzoek naar opbrengstgericht werken bij rekenen-wiskunde in het basisonderwijs. [Data-driven decision making in primary education. A study on data-driven decision making in mathematics education]*. Utrecht: Insectie van het Onderwijs.
- Educational Inspectorate. (2012). *De kwaliteit van leraren. Onderwijs verslag 2010/2011. [The state of education. Educational year report 2010/2011]*. Utrecht: Inspectie van het Onderwijs.
- European Consortium for Accreditation. (2014). *Higher educational system in The Netherlands*. Retrieved on 20 November, 2017 from http://ecahe.eu/w/index.php/Higher_education_system_in_The_Netherlands.
- Fleiss, J. L., Levin, B., & Paik, M. C. (2003). *Statistical methods for rates and proportions* (3rd ed.). Hoboken: John Wiley & Sons.
- Frenzel, A. C., Goetz, T., Lüdtke, O., Pekrun, R., & Sutton, R. E. (2009). Emotional transmission in the classroom: Exploring the relationship between teacher and student enjoyment. *Journal of Educational Psychology*, 101(3), 705–716. <https://doi.org/10.1037/a0014695>.
- Good, T. L., McCaslin, M., Tsang, H. Y., Zhang, J., Wiley, C. R. H., Bozack, A. R., et al. (2006). How well do 1st-year teachers teach: Does type of preparation make a difference? *Journal of Teacher Education*, 57(4), 410–430.
- Harbour, K. E., Evanovich, L. L., Sweigart, C. A., & Hughes, L. E. (2015). A brief review of effective teaching practices that maximize student engagement. *Preventing School Failure: Alternative Education for Children and Youth*, 59(1), 5–13.
- Hill, H. C., Ball, D. L., Blunk, M. L., Goffney, I. M., & Rowan, B. (2007). Validating the ecological assumption: The relationship of measure scores to classroom teaching and student learning. *Measurement: Interdisciplinary Research and Perspectives*, 5(2), 107–118.
- Impedovo, M. A., & Khatoun Malik, S. (2016). Becoming a reflective in-service teacher: Role of research attitude. *Australian Journal of Teacher Education*, 41(1), 100–112.
- Klein, J. (2004). Planning middle school schedules for improved attention and achievement. *Scandinavian Journal of Educational Research*, 48(4), 441–450.
- Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805–820.
- Kunter, M., Tsai, Y.-M., Klusmann, U., Brunner, M., Krauss, S., & Baumert, J. (2008). Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction. *Learning and Instruction*, 18(5), 468–482.
- Kuyper, H., & Guldemond, H. (1997). *Studievaardigheden en huiswerkgedrag in de bovenbouw van HAVO en VWO [Study skills and homework behavior in the upper years of senior general secondary education and university preparatory education]*. Groningen: GION.
- Kyriakides, L., Campbell, R. J., & Christofidou, E. (2002). Generating criteria for measuring teacher effectiveness through a self-evaluation approach: A complementary way of measuring teacher effectiveness. *School Effectiveness and School Improvement*, 13(3), 291–325.
- Kyriakides, L., Creemers, B. P. M., & Antoniou, P. (2009). Teacher behavior and student outcomes: Suggestions for research on teacher training and professional development. *Teaching and Teacher Education*, 25, 12–23.
- Little, R. J. A., & Rubin, D. B. (1987). *Statistical analysis with missing data*. New York: John Wiley & Sons.
- Maulana, R., Helms-Lorenz, M., & van de Grift, W. (2015). A longitudinal study of induction on the acceleration of growth in teaching quality of beginning teachers through the eyes of their students. *Teaching and Teacher Education*, 51, 225–245.
- (n.d.) Ministry of education, culture and arts. Instroom vwo'ers. [Influx of pre-university students]. Retrieved on 22 August, 2018 from <https://www.ocwincijfers.nl/verantwoord-begroten/dashboard-lerarenagenda/lijn-3-aantrekkelijker-en-flexibele-leerroutes/instroom-vwoers>.
- (n.d.) National network of academic teacher training programs. Uitstrooprofiel academische pabo. [Graduation profiles academic teacher training program]. Retrieved on 11 November, 2017 from <http://media.leidenuniv.nl/legacy/landelijke-uitstrooprofiel-academische-pabos.pdf>.
- National network of academic teacher training programs. (2018). *900 academische leerkrachten voor het primair onderwijs. [900 academic primary school teachers]*. Retrieved on 6 September, 2018 from <https://www.unipa.nl/nieuws/900-academische-leerkrachten-po>.
- Nuffic. (2015). *Education system The Netherlands*. Retrieved at 19 October 2016 from <https://www.epnuffic.nl/en/publications/find-a-publication/education-system-the-netherlands.pdf>.
- Palardy, G. J., & Rumberger, R. W. (2008). Teacher effectiveness in first grade: The importance of background qualifications, attitudes, and instructional practices for student learning. *Educational Evaluation and Policy Analysis*, 30(2), 111–140.
- Panayiotou, A., Kyriakides, L., Creemers, B. P., McMahon, L., Vanlaar, G., Pfeifer, M., et al. (2014). Teacher behavior and student outcomes: Results of a European study. *Educational Assessment, Evaluation and Accountability*, 26(1), 73–93.
- Rice, J. K. (2003). *Teacher quality: Understanding the effectiveness of teacher attributes*. Washington, DC: Economic Policy Institute.
- Schaffer, E., Stringfield, S., & Wolfe, D. (1992). An innovative beginning teacher induction program: A two-year analysis of classroom interactions. *Journal of Teacher Education*, 43(3), 181–192.
- Scheerens, J. (2016). *Educational effectiveness and ineffectiveness: A critical review of the knowledge base*. Dordrecht, the Netherlands: Springer.
- Seidel, T., & Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis results. *Review of Educational Research*, 77(4), 454–499.
- Snijders, T. A. B., & Bosker, R. J. (2011). *Multilevel analysis. An introduction to basic and advanced multilevel modeling* (2nd ed.). London: SAGE publications Inc.
- Stamos. (2017). *Factsheet: Gediplomeerden lerarenopleidingen. [Factsheet: Graduates of the teacher training programs]*. Retrieved on 6 September, 2018 from <http://stamos.nl/downloads/Factsheet%20aantal%20gediplomeerden%20aan%20de%20lerarenopleidingen%20in%20Nederland.pdf>.
- Steffy, B. E., & Wolfe, M. P. (2001). A life-cycle model for career teachers. *Kappa Delta Pi Record*, 38(1), 16–19.
- Stronge, J. H., Ward, T. J., & Grant, L. W. (2011). What makes good teachers good? A cross-case analysis of the connection between teacher effectiveness and student achievement. *Journal of Teacher Education*, 62, 339–355.
- Trawick-Smith, J., & Dziurgot, T. (2010). Untangling teacher-child play interactions: Do teacher education and experience influence “good-fit” responses to children's play? *Journal of Early Childhood Teacher Education*, 31(2), 106–128.
- Uibu, K., Kikas, E., & Tropp, K. (2011). Instructional approaches: Differences between kindergarten and primary school teachers. *Compare: A Journal of Comparative and International Education*, 41(1), 91–111.
- Van Veen, K. (2011). Het niveau en de kwaliteit van leraren in het basisonderwijs en voortgezet onderwijs: Wat is het probleem? [The level and quality of teachers in primary and secondary education: What is the problem?]. *Pedagogische Studiën*, 88(6), 422–433.
- Van de Grift, W. J. C. M. (2007). Quality of teaching in four European countries: A

- review of the literature and an application of an assessment instrument. *Educational Research*, 49(2), 127–152.
- Van de Grift, W., Helms-Lorenz, M., & Maulana, R. (2014). Teaching skills of student teachers: Calibration of an evaluation instrument and its value in predicting student academic engagement. *Studies In Educational Evaluation*, 43, 150–159.
- Van de Grift, W. J. C. M., Van der Wal, M., & Torenbeek, M. (2011). Ontwikkeling in de pedagogische didactische vaardigheid van leraren in het basisonderwijs [[The development of pedagogical- didactical competencies of primary school teachers]]. *Pedagogische Studiën*, 88(6), 416–432.
- Veenman, S., & Raemaekers, J. (1995). Long-term effects of a staff development programme on effective instruction and classroom management for teachers in multigrade classes. *Educational Studies*, 21(2), 167–185.
- Wayne, A. J., & Youngs, P. (2003). Teacher characteristics and student achievement gains: A review. *Review of Educational Research*, 73(1), 89–122.