



## UvA-DARE (Digital Academic Repository)

### Primary teacher educators' perception of desired and achieved pedagogical content knowledge in geography education in primary teacher training

Blankman, M.; Schee, J.; Volman, M.; Boogaard, M.

**DOI**

[10.1080/10382046.2014.967110](https://doi.org/10.1080/10382046.2014.967110)

**Publication date**

2015

**Document Version**

Final published version

**Published in**

International Research in Geographical and Environmental Education

[Link to publication](#)

**Citation for published version (APA):**

Blankman, M., Schee, J., Volman, M., & Boogaard, M. (2015). Primary teacher educators' perception of desired and achieved pedagogical content knowledge in geography education in primary teacher training. *International Research in Geographical and Environmental Education*, 24(1), 80-94. <https://doi.org/10.1080/10382046.2014.967110>

**General rights**

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), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

**Disclaimer/Complaints regulations**

If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: <https://uba.uva.nl/en/contact>, or a letter to: Library of the University of Amsterdam, Secretariat, P.O. Box 19185, 1000 GD Amsterdam, The Netherlands. You will be contacted as soon as possible.

*UvA-DARE is a service provided by the library of the University of Amsterdam (<https://dare.uva.nl>)*

## Primary teacher educators' perception of desired and achieved pedagogical content knowledge in geography education in primary teacher training

Marian Blankman<sup>a\*</sup>, Joop van der Schee<sup>b</sup>, Monique Volman<sup>c</sup> and Marianne Boogaard<sup>a</sup>

<sup>a</sup>*School of Education in Holland, University of Applied Sciences, Haarlem, the Netherlands;*

<sup>b</sup>*Faculty of Psychology and Education, VU University, Amsterdam, the Netherlands;* <sup>c</sup>*Research Institute of Child Development and Education, University of Amsterdam, Amsterdam, the Netherlands*

This paper presents the findings of a study conducted among primary geography teacher educators. The research examines the perceptions of educators of primary teacher students' desired and achieved levels of substantial knowledge, syntactic knowledge, and beliefs about the subject of geography. The findings indicate that primary teacher educators do not view their students as having significant knowledge about geography. They believe their students have better syntactic knowledge and beliefs about the subject of geography, however. Teacher educators believe that more hours of teaching and more attention to subject knowledge could raise the quality of primary teacher training in geography.

**Keywords:** primary teacher education; pedagogical content knowledge; perception

### Introduction

A well-developed foundation of subject knowledge is an important prerequisite to teach a subject such as geography successfully. "Pupils cannot be taught simply to think. They have to have something to think about," is what Lambert states in his personal opinion on the subject matter (Lambert, 2009, p. 1). In the context of the primary geography curriculum, teachers' lack of subject knowledge has been identified as problematic for some time in the Netherlands as well as in the United Kingdom (Bell, 2005; Notté & Baltus, 2011; Ofsted, 2011). Mainly, non-specialist class teachers teach the entire primary curriculum (Catling, 2004; Catling & Willy, 2009; Martin, 2006), quite a challenging task in which not all teachers succeed. In this context, the conclusion of a recent inspection of primary schools in England is that improvements in geography were often slowed down by primary teachers' weak knowledge of geography and their lack of confidence in teaching this subject, which was attributed to insufficient subject-specific training (Ofsted, 2011).

The weak foundation of geographical knowledge of Dutch primary student teachers is reflected in the scores of an entrance test which focuses on the knowledge, skills, and understanding about main geographic topics taken by students at the beginning of their first year. Only about 50% of these students pass this entrance test with an 8+ level at the beginning of the first year. Level 8+ means a slightly higher score than that of a pupil at the end of primary school (11–12 years old) (Notté & Baltus, 2011).

In the Netherlands, student teachers can enter primary teacher training after completing their secondary education (five to six years) or senior secondary vocational education

---

\*Corresponding author. Email: [marian.blankman@inholland.nl](mailto:marian.blankman@inholland.nl)

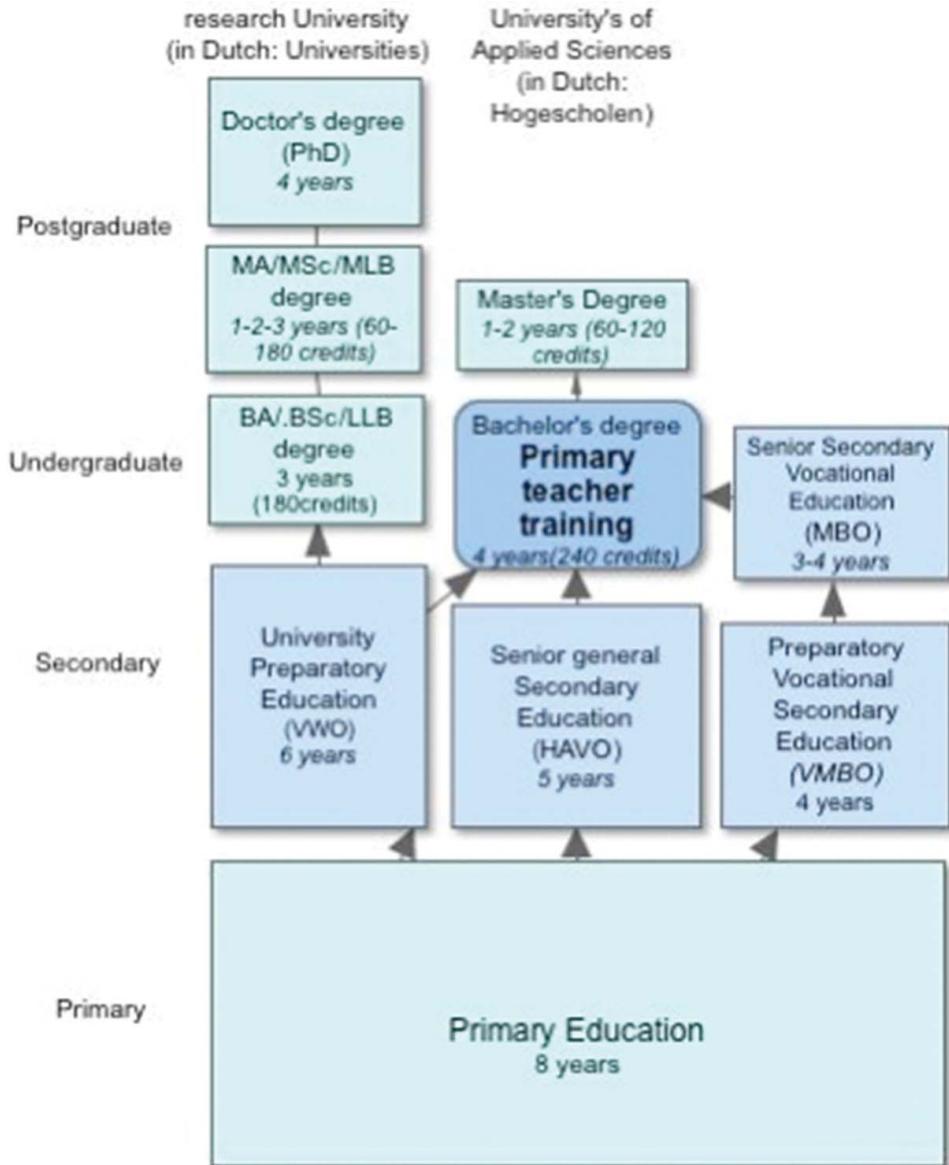


Figure 1. The Dutch educational system.

(see Figure 1). The last group of student teachers probably had their last geography lesson several years ago, and their subject knowledge is often weak. Many student teachers only had three years of geography in secondary education at lower secondary level.

No doubt that subject knowledge is of great importance for being an effective primary teacher, and as Lambert states: “forming productive relationships with children is very important. My view is that this task is made more possible when the teacher is able to form a productive and creative relationship with the subject matter” (Lambert, 2009, p. 2). However, he adds: “This subject knowledge new teachers bring from their experiences in higher education or elsewhere has to be reworked before it can be taught

effectively” (Lambert, 2009, p. 2). Experienced teachers possess what Shulman (1986) calls pedagogical content knowledge (PCK). PCK can be described as the combined knowledge, pedagogical skills, and attitude or motivation to teach a subject.

It is this combination of knowledge, skills, and attitudes that teacher educators need to develop with their student teachers. This challenging task was the starting point of this research. As a teacher educator, the first author faced the problem of not being able to bridge the gap between the desired and the achieved level of PCK for her diverse group of student teachers in a limited number of teaching hours, and she wondered whether other teacher educators faced the same problem. In the Netherlands, little research has been done into the images held by primary teacher educators about PCK development in the subject of geography about their student teachers. To verify whether colleagues shared the faced problem, a questionnaire was distributed among primary geography teacher educators ( $n = 66$ ). The main aim of this study is to obtain more insight into the desired and achieved levels of PCK among primary student teachers, according to their teacher educators, and the factors that may contribute to closing the gap between desired and achieved levels of geographical PCK.

## Theoretical background

### *PCK*

The concept of PCK was introduced by Shulman (1986). According to Shulman, PCK is about subject matter for teaching, and it includes:

the most regular taught topics in a subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations and demonstrations – in a word, the ways of representing and formulating the subject that makes it comprehensible to others. (Shulman, 1986, p. 9)

It also includes:

an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning. (Shulman, 1986, p. 9)

Shulman distinguished seven knowledge bases of which PCK is one: content knowledge, general pedagogical knowledge, curriculum knowledge, PCK, knowledge of learners, knowledge of educational contexts, and knowledge of educational ends, purposes, and values (Shulman, 1987). Elaborating on Shulman’s work, various scholars have proposed different conceptualizations of PCK (Berry, Loughran, & Van Driel, 2008). In a review of the literature, Van Driel, Verloop, and de Vos (1998) found that there is no generally accepted conceptualization of PCK. Several scholars (Cochran, King, & DeRuiter, 1991; Grossman, 1990) argue for a more integrated concept in which knowledge components are part of PCK. However, there is agreement on the nature of the two key elements distinguished by Shulman, which are knowledge of representations of subject matter and understanding of specific learning difficulties and student conceptions. In addition, there appears to be agreement on the nature of PCK as a concept that is concerned with the teaching of particular topics and is developed through an integrative process rooted in classroom practice.

Turner-Bisset (1999) found that it was impossible to distinguish between content knowledge and PCK: in the act of teaching, all knowledge was presented pedagogically in some way (Turner-Bisset, 1999, p. 42). She also proposes a more integrated concept

and developed a comprehensive model of knowledge bases for teaching in which PCK is seen as an overarching base. She distinguishes three types of knowledge, which pertain to content knowledge or subject matter knowledge: substantive knowledge, syntactic knowledge, and beliefs about the subject. The substantive knowledge consists of the facts and concepts of a discipline (the knowing that). Syntactical knowledge refers to the ways and means by which the knowledge has been generated and established (the knowing how). Beliefs about the subject finally refer to the impact that personal orientation and the conceptions toward a subject have on teaching a subject (Turner-Bisset, 1999, p. 43).

Martin (2005, p. 63) builds on these three bases of content knowledge and relates them, in terms of teaching, to the following questions: What am I going to teach, how am I going to teach it? Why am I going to teach it in this way?

In this study, we will take these three questions as a starting point for a PCK model for the subject of geography in primary education. We consider these questions the three most important questions primary teacher students should ask themselves when preparing their lessons for practice; they can also form the foundations of a curriculum model for learning to teach geography in primary education. Formulating these three related knowledge bases into questions as a conceptual framework for teaching makes the concept concrete for students and it can help students to better structure and understand what it means to learn to teach geography.

Loughran, Mulhall, and Berry (2008) explicitly used the idea of PCK – as a conceptual framework – in a pre-service science teacher program and found that (student) teacher participants learned to explicitly use PCK as a way of thinking about their own teaching and learning. It gave them confidence and made them look beyond simply gathering up “activities that work.” It helped them shift their focus from teaching and managing to children and learning. Their questions transformed from “How do I (have to) do this?” into “What do children need to learn, how might they best learn it, and why do they need to learn it in this way?” (Martin, 2005, p. 68). According to Martin, a transformative process should take place at two levels: at the student teachers’ level of understanding the subject and at the level of transforming the subject into forms suitable for teaching. Or as Lambert (2009) stated: “They learn how to rework the subject knowledge so it can be taught effectively.”

### **PCK-G**

To successfully teach the subject of geography, (student) teachers need to rework geographic content by asking themselves the three questions Martin (2005) formulated based on Turner-Bisset’s (1999) knowledge bases: What am I going to teach? How am I going to teach it? Why am I going to teach it in this way? Figure 2 illustrates the combination of PCK and the subject of geography (PCK-G). PCK-G is the type of integrated knowledge that is unique to teachers teaching geography; it is what teaching geography is about (Cochran et al., 1991).

The International Charter on Geographic Education of the International Geographical Union gives an overview of the content (or subject knowledge, WHAT) for the field of geography that should be studied. It also describes the set of knowledge, understanding, skills, attitudes, and values students should explore and develop in the course of their education (Haubrich, 1992). To shape the content, “big concepts” (e.g., space, place, scale, location, and interdependence) can be used (Taylor, 2008). Several authors have tried to define these concepts that form the core of geography (Catling & Willy, 2009; Kulke, Hemmer, & Schallhorn, 2007; Martin, 2006; Martin & Owens, 2004; Taylor, 2008). In

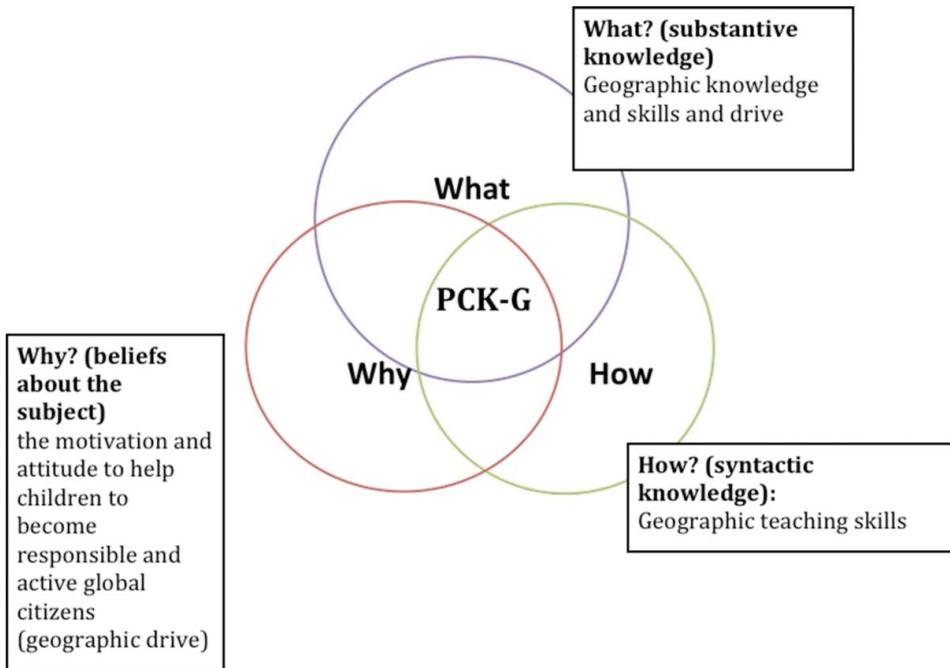


Figure 2. PCK for the subject of geography.

combining knowledge and skills and using big concepts to shape content, young people in general and student teachers in particular acquire control over this content and develop their geographic literacy or consciousness. Van der Vaart (2001) refers to geographic literacy as “a combination of a way of thinking and a certain geographic knowledge base.” He distinguished three key competencies: (1) knowledge about world phenomena, processes, and distributions, including topography, (2) issues of place and space such as inequality and sustainable development, and (3) geographic skills such as map skills (Van der Vaart, 2001, p. 19). The first two competencies focus on geographic knowledge, and the third competency on the skills needed to do geography. These skills can start with simple map skills and develop to skills needed to establish relationships between phenomena and more general theoretical knowledge.

To actively participate in the world, these knowledge and skills are needed. This active participation in the world is what Favier (2011) calls “geographic drive,” defined as: “A certain level of geographic (enquiry) motivation, which refers to the willingness to study the characteristics, functioning and problems of the world around us” (Favier, 2011, p. 12). This geographic drive helps (student) teachers to develop the motivation and attitude (WHY) to help children to become responsible and active global citizens – which is an important aim of geography education (Haubrich, 1992; Martin, 2006). Finally, (student) teachers transform their geographic literacy and their geographic drive into teaching skills to teach primary school pupils (HOW).

To summarize, we can distinguish three levels in geography teaching, which are illustrated in Figure 3.

First, *student teachers* need well-developed geographic subject knowledge, skills, and drive (WHAT). Second, they need to transform such knowledge, skills, and drive into forms suitable for teaching (HOW): they should teach *pupils* how to use a map and an

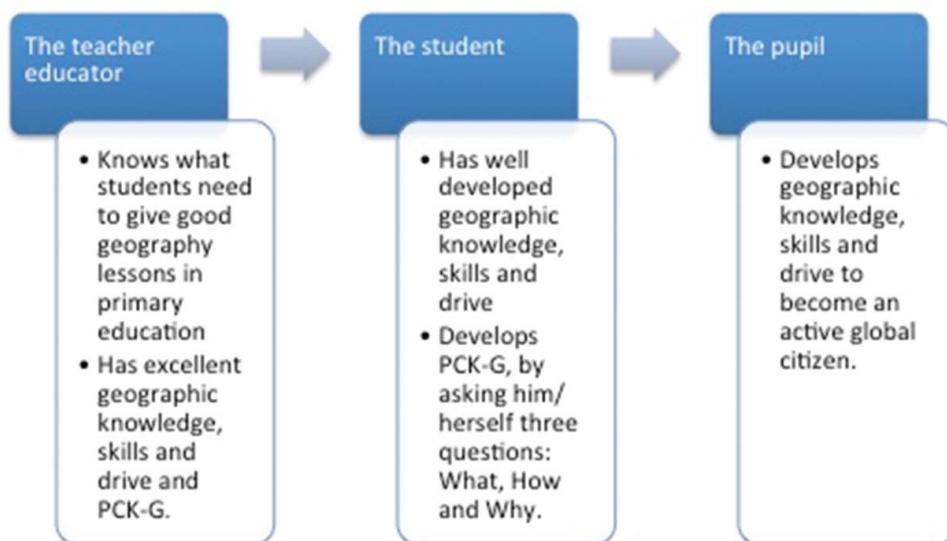


Figure 3. Three levels in geography teaching.

atlas, ask them geographic questions, and teach them to approach reality from different perspectives. Finally, student teachers must do that from the perspective of helping pupils to become responsible and active global citizens (WHY). As a result of this, pupils will develop their geographic knowledge, geographic skills, and geographic drive. Geography *teacher educators* have the challenging task to support the development of primary student teachers' PCK to enable them to teach the subject of geography to their pupils. To be capable of doing this, teacher educators need excellent PCK-G.

Based on the concept of PCK-G, a survey was developed with the aim to obtain more insight into what teacher educators considered as the desired and actually achieved levels of PCK for their student teachers at the end of initial teacher training and about the factors that influence these results. This has led to the following research questions:

- (1) What is the desired level of PCK-G for primary student teachers at the end of training, according to their teacher educators?
- (2) What is the achieved level of PCK-G for primary student teachers at the end of training, according to their teacher educators?
- (3) What are factors that promote or impede achieving the desired level of PCK-G in initial teacher training in primary education?

Answers to these questions contribute to our knowledge about the primary student teachers' education and contribute to bridging the gap between PCK theory and teacher education practice.

## Method

### Design

A descriptive study was developed to answer the research questions. Data were collected through a questionnaire for teacher educators teaching geography, which was administered in digital form (Google docs).

### Participants

An invitation to complete the questionnaire was sent to everyone listed in the directory of the primary teacher-training network of the Royal Dutch Geographical Society, in which at least 90% of the Dutch primary geography teacher educators are listed. After a few weeks, a reminder was sent to the non-responders. The incoming data were automatically stored in a database.

Of a total of 66 addresses, 39 teacher educators (59% response) completed the questionnaire. More than two-thirds (69%) of the respondents was male. The average age of the respondents was 47, although the average age of female respondents was lower than their male colleagues. Male respondents had more years of experience in primary teacher training (Table 1). Female teacher educators entered more recently in primary teacher training, 82% of them had a university degree in geography compared to 27% of their male colleagues, who usually entered primary teacher training after several years of working as a primary or secondary school teacher. Over 70% of the teacher training institutes working method is competency based. Most geography lessons are given in the first two years of study. First- and second-year students each year can achieve 0–2.5 European credits (1 European credit = 28 hours of study), and they receive 6–10 full hours each year of lectures in the field of geography in nearly half of the teacher training institutes. In the third and fourth years, the number of teaching hours for geography and the number of credits to be obtained are fewer.

### Instruments and data collection

A questionnaire for measuring teacher educators' perceptions of desired and achieved levels of PCK-G was developed in several steps. A first version of the questionnaire was developed based on the literature on PCK and geographic literacy. This version of the questionnaire was pre-tested among a group of researchers and methodologists. Based on

Table 1. Characteristics of the respondents.

		Gender		Total
		Male	Female	
Age group according to gender				
Age	<35 years	2	2	4
	35–44 years	6	6	12
	45–54 years	10	3	13
	>55 years	9	1	10
Total		27	12	39
Number of years working in primary teacher training according to gender				
Number of years	0–5 years	5	3	8
	6–10 years	11	6	17
	11–15 years	4	2	6
	>15 years	7	1	8
Total		27	12	39

their feedback, a second version was designed and tested with a panel of scientists and geography educators, focusing on usability and clarity.

The resulting questionnaire consists of 62 questions. Most questions are multiple-choice questions or closed items to be answered on a five-point Likert scale. With values: <10%, 10%–40%, 41%–60%, 81%–90%, and >90% of their students for the questions about the achieved level of PCK and values classified as: not at all necessary, not necessary, maybe necessary, necessary, and really necessary for the questions about the desired level of PCK. A few open questions were added to collect information about the perceived quality of primary teacher training which might explain the discrepancy between desired and achieved levels of PCK-G. The questionnaire contains questions about the achieved and desired levels of PCK in the subject of geography of primary student teachers at the end of the four-year course, according to their teacher educators. (Research questions 1 and 2)

First, questions were included about content knowledge (WHAT questions, 12 items). These were based on the attainment targets for the subject knowledge and skills (geographic literacy) of Dutch primary school teachers. All questions were asked in the form of statements. These statements are included in Table 2. Student teachers who possess a well-developed mental map, for example, are able to outline the distribution of human and natural activities in the world. This includes an active map image. Student teachers who have an understanding of spatial issues can describe and explain, for example, environmental problems, spatial inequality, and global climate change.

Second, questions were included about syntactic knowledge (HOW questions, 14 items). In these questions, teacher educators were asked whether their student teachers were able to transform their own geographic knowledge and skills into forms suitable for teaching and whether, for example, they can teach pupils to use maps and atlases and ask them geographic questions.

In order to measure beliefs about geography (WHY questions, 10 items), questions were asked about the interest of the student teachers in the subject and the connection with primary school practice, their curiosity about the world around them, and whether students recognize the fact that many decisions in daily life are geographic in nature.

To find an answer to research question 3, the questionnaire included questions about factors that promote or impede work on the quality of teacher training (eight questions). For instance, questions about innovations in higher education, the number of geography lessons during teacher training, and the motivation of students for the subject of geography. These questions were developed in expert meetings with colleague teacher trainers.

To gain more insight into the organization of teacher training, questions were asked about the number of teaching hours devoted to the subject of geography and the attention to subject matter knowledge (nine questions). Finally, there were questions that collected some background characteristics of the respondents (six questions).

### **Analyses**

The collected data were summarized in descriptive results. Means and standard deviations were calculated. Internal consistency of the scales was tested, and items were only analyzed as scales if Cronbach's alpha > 0.7.

### **Results**

Table 2 shows the results of the closed items of the questionnaire expressed in terms of average percentages (achieved level) and mean scores (desired level).

Table 2. Achieved and desired levels of PCK-G at the end of training according to their teacher educators.

<i>N</i> = 39	Achieved level (average percentage)	Desired level (mean score)
<b>Substantial knowledge at the end of training (WHAT)</b>		
<i>Mental map</i>		
Students can indicate on a world map features such as climate, landscape areas, population distribution, and poor and rich areas.	47	4.5
Students can indicate on a map all 300 topographic names from the topography list (used in the Netherlands)	30	4.0
<i>Students can explain the following spatial issues (these spatial issues are part of the Dutch secondary curriculum):</i>		
Climate change	40	4.2
Environmental problems	39	4.3
Global migration flows	36	4.2
The process of globalization	35	4.3
<b>Syntactic knowledge at the end of training (HOW)</b>		
Students can ask pupils geographic questions.	64	4.6
Students teach pupils to approach the world around them from different perspectives.	61	4.5
Students use atlases and maps where possible during their practice.	60	4.7
Students can evoke the imagination of pupils about phenomena and places.	58	4.8
Students use the goals for the field of geography when designing their lessons.	55	4.5
Students teach pupils to approach the world around them at different levels of scale.	46	4.2
Students can apply all map skills during their lessons.	45	4.3
<b>Beliefs about the subject of geography at the end of training (WHY)</b>		
Students are motivated about the subject of geography during teacher training if there is a connection to primary school practice.	68	4.3
Students are motivated about the subject of geography during teacher training.	51	4.0
Students are interested in the subject of geography during teacher training.	50	4.0
Students are curious about the world around them.	47	4.5
Students recognize that many decisions in daily life are geographical in nature.	34	4.2

### *The desired and achieved levels of substantial knowledge*

Teacher educators believe it is essential that student teachers have a geographic world-view and can explain the spatial expression of issues such as climate change, environmental problems, global migration flows, and the process of globalization (mean between 4 and 5 on a five-point Likert scale).

Nonetheless, according to these teacher educators, only 47% of their primary student teachers can indicate features such as climate, landscape areas, population distribution, and poor and rich areas on a world map at the end of training, while only 30% of their student teachers can indicate the 300 topographic names on a map at the end of training, which is compulsory in Dutch education.

Concerning the explanation of the spatial expression of issues, teacher educators think that an average percentage of 35%–40% of the student teachers are able to do this at the end of training.

### ***The desired and achieved levels of syntactic knowledge***

Again, teacher educators believe that it is necessary (mean between 4 and 5 on a five-point Likert scale) that their student teachers possess syntactic knowledge at the end of training.

Teacher educators are more positive (although scores are quite low) about the achieved level of syntactic knowledge of their student teachers at the end of training than they are about the student teachers' content knowledge. This may reflect the fact that more attention is paid to syntactic knowledge in the teacher training. They are most positive about the ability of their student teachers to ask pupils geographic questions (64%), to teach pupils to approach the world around them from different perspectives (61%), and to use maps and atlases during their practice in primary school (60%). The teacher educators view the ability of their student teachers less favourably in their ability to evoke the imagination of pupils about phenomena and places (58%) or to use the goals for the field of geography when designing their lessons (55%). Teacher educators were most skeptical about their student teachers' use of map skills in the lessons in primary school (45%) and about the ability of student teachers to teach pupils to approach the world around them at different levels of scale (46%).

### ***The desired and achieved levels of beliefs about the subject of geography***

With regard to beliefs about the subject of geography at the end of training, teacher educators believed that it is necessary (mean score 4.0) that student teachers be motivated and interested in the subject of geography at the end of training. However, they believed that only 50%–51% of their student teachers were interested in and motivated about the subject of geography during teacher training. According to the teacher educators, this motivation is higher when there is a connection to primary school practice (68%). Even less satisfied were teacher educators about the curiosity of student teachers about the world around them (47%), a competence teacher educators find essential for primary school teachers (mean score 4.5). Finally, Table 2 shows that teacher educators think that only 34% of their student teachers recognizes that many decisions in daily life are geographic in nature.

### ***Factors that may promote or impede achieving the desired level of PCK-G in initial teacher training in primary education***

Respondents were asked to comment on a number of statements on promoting and impeding factors, and to answer some open questions. They also gave their opinion on a number of quotes on the quality of geography teaching at their institutions that may provide explanations for the discrepancy between the desired and achieved levels of PCK-G in teacher education.

More than 40% of the teacher educators believe that the quality of primary teacher training deteriorated after 2000, the moment at which the new system of competence-

based teaching was introduced at most teacher training institutes in the Netherlands. The main reasons for this, according to the teacher educators, are the reduction in the number of hours in the educational program spent on geography and the reduced focus on subject matter in general at their institution. According to more than 50% of the respondents, the number of hours spent on geography at their institution after 2000 was reduced. They find it difficult to prepare students to provide good geography lessons at primary school in this limited number of hours. Also, more than 50% of the respondents state that the focus on subject matter in general at their institution was reduced after 2000. Teacher educators expected that more hours of teaching and a greater focus on substantial knowledge (WHAT) could diminish the discrepancy between desired and actually achieved levels of PCK-G in primary teacher training. Respondents see substantial knowledge as a prerequisite for syntactic knowledge (HOW). As one of the respondents put it: "Pedagogical skills cannot develop if there is too little subject matter baggage." Both kinds of knowledge are essential.

Besides too few teaching hours and too little focus on the subject matter, respondents mention the limited and also widely varying knowledge base of the students when they enter teacher education as important impeding factors affecting the quality of geography education. This makes it even more difficult to develop a relevant program for all students within the limited number of teaching hours. Respondents are also critical about their own role and the fact that there is little agreement on the appropriate teaching strategy for primary education. Teacher educators should become better organized as a professional group. Respondents also believe the primary school in which students do their internship does not always provide a good example; the subject of geography often has no priority and the mostly textbook-based lessons turn many geography lessons into reading comprehension lessons.

Although motivation was mentioned only a few times as a relevant factor for explaining discrepancies between intended and achieved levels of PCK-G, respondents agree with the statement that student teachers who are motivated to teach the subject of geography provide better geography lessons in primary school. Associated with motivation, the respondents also reviewed their own role as teacher educators. According to the respondents, the quality of teacher educators should also be improved. Teacher educators should be excellent and passionate. They should "be able to bring about the magic of geography." Some respondents blame the problem on the shift in Dutch higher education toward competence-based learning.

Finally, respondents were asked to indicate three actions the Minister of Education should take to improve geography education in primary teacher training. The actions most often mentioned were: more attention to subject knowledge, higher demands on the entry level, the possibility of different levels in the outflow of students, promotion of research, higher demands on the quality of trainers, and improvement in the position of the subject of geography in primary school.

### **Conclusions and discussion**

Although primary teacher educators believe that all aspects of PCK-G are really necessary, their opinions on the achieved level of PCK-G of their student teachers at the end of initial training vary. What stands out is that they have a negative view of the substantive knowledge of their students, and especially about their students' ability to indicate topographic names on a map and to explain spatial issues, but they have a more positive opinion about the ability of their students to indicate spatial phenomena on a world map.

To indicate topographic names on a map, student teachers should be able to read maps or have a good memory. Simple map reading skills help students to describe or name localized objects (facts). To identify spatial phenomena such as population distributions on a map, students need to organize and order objects (concepts), which is a somewhat more complex skill. When student teachers explain spatial issues such as migration flows, they have to establish relationships between phenomena and more general theoretical knowledge, which is the most complex skill (Van der Vaart, 2001). Table 2 showed that teacher educators think the easiest skill is achieved by the lowest percentage of their students. A remarkable finding, which relates to the way students and pupils learn facts. Recent research shows that the topographic knowledge of pupils at the end of primary school is highly unsatisfactory, although a great deal of time is spent on it (Notté, Van der Schoot, & Hemker, 2010). The main reason for this can be found in the fact that topographic names are learned as individual facts and not offered in a functional context. In the course of primary (and secondary) education, primary student teachers have learned topographic names in this way and, just as primary school pupils tend to do, they forgot many of those names. This can explain the fact that their teacher educators think that only 30% of their students will be able to indicate all the 300 topographic names on a map. Therefore, it is recommended that primary teacher students – as part of their PCK-G development – learn topographic names in a functional context themselves, and subsequently learn how to teach primary school pupils topographic names in this way.

The question we have to ask about student teachers learning of all elements of geography is: From what perspective do teacher educators look at the achieved level of PCK? Do experts, such as teacher educators, not always expect a higher level of PCK-G of their student teachers than they eventually reach? Results from recent inspections in primary education show a similar trend. Many pupils stay behind the desired level formulated in the standards (Notté et al., 2010; Ofsted, 2011).

As an outcome of the debate on the level of subject knowledge of primary student teachers, the Minister of Education of the Netherlands ordered formulation of knowledge bases for all school subjects that capture the final level for these subjects (Van Bijsterveldt-Vliegenthart, 2008). In a recent recommendation by the Netherlands Association of Universities of Applied Sciences (HBO-raad), five actions were proposed to improve the subject knowledge of (future) primary teachers. One of them is to set requirements (students should meet at least a level of (in our case geographic) knowledge equivalent to the level reached after three years of secondary education) on the intake of students (Meijerink, 2012). These actions may (partly) improve the quality of primary school teachers as the experiences in Finland suggest, a country with high scores on the PISA rankings. Primary school teachers in Finland need to earn at least a master's degree in education, in addition to a bachelor degree in one or more content areas. Besides that, to enter teacher training, candidates must have good scores and excellent interpersonal skills as well as a deep personal commitment to teaching and working in schools (Sahlberg, 2011). It is a pity that we cannot realize the "Finnish model" in the Dutch educational system within a few years. The main constraint is the recruitment of enough good teachers.

A higher level of substantial knowledge, according to the teacher educators in our study, is a prerequisite for syntactic knowledge. Both forms of knowledge are needed to provide meaningful and challenging education, but there is no agreement (in the Netherlands) about the appropriate teaching method for the subject of geography within the mostly competence-based primary teacher training programs, according to the respondents.

Concerning this subject, several studies (Alkis, 2009; Catling, 2004; Corney, 2000; Lane & Coutts, 2012; Martin, 2000, 2005; Morley, 2012) suggest that it is important to

take into account the preconceptions, images of geography, and teaching of student teachers because they influence their thinking about teaching and classroom practice. Martin's study of the knowledge bases for effectively teaching primary geography (Martin, 2008) describes the influences affecting student development as teachers of primary geography. She makes a distinction between formal school learning and informal everyday learning and states that a barrier exists between the informal geographical experiences in the world (the everyday self as a learner) and the student (self) as a teacher. She believes it is the teacher educator's responsibility to find ways of removing the barrier that currently appears to prevent student teachers from utilizing the everyday self as learner base. She states that it seems necessary to develop a way of conceptualizing geography that (1) enables students to recognize the value of their everyday experience and that they are already thinking geographically in their everyday lives and (2) is suited to the context that the students are working in – that of primary school – and this is a paradigm she refers to as “everyday” or “ethnogeography.”

Teacher education should enable student teachers to make connections between their everyday experiences and the way geographers make sense of the world by means of geographical imagination: a lens through which to make sense of the world using the big ideas of geography, such as place, connectedness, scale, process, and skills (Martin, 2008, p. 36). Catling and Martin (2011) recognize both forms of knowledge as powerful. They introduce a model based on Young (2010) in which, other than Young who valorizes the academic knowledge above the everyday knowledges, both the everyday perspectives and the academic perspectives are seen as powerful and where the dialogue between these two forms of knowledge provides the most effective base from which to act as an effective teacher of primary geography. It would be interesting to conduct more research on the connection between everyday knowledge and academic knowledge as appropriate teaching strategy for developing student teacher PCK-G.

Little research has been done on the image that primary teacher educators have of their students. This study just gives information about some views of primary teacher educators in the specific situation of the Dutch educational system. It would be interesting to conduct a similar study in a more international context and on a larger scale, with more information about the ability of primary student teachers in developing good geography lessons and student teachers' views to contrast them with that of the teacher educators.

## References

- Alkis, S. (2009). Turkish geography trainee teachers' perceptions of geography. *International Research in Geographical and Environmental Education*, 18(2), 120–133.
- Bell, D. (2005). The value and importance of geography. *Primary Geography*, 56, 4–5.
- Berry, A., Loughran, J., & Van Driel, J. H. (2008). Revisiting the Roots of Pedagogical Content Knowledge. *International Journal of Science Education*, 30(10), 1271–1279.
- Catling, S. (2004). An understanding of geography: The perspectives of English primary trainee teachers. *Geo Journal*, 60, 148–158.
- Catling, S., & Martin, F. (2011). Contesting powerful knowledge: The primary geography curriculum as an articulation between academic and children's (ethno) geographies. *The Curriculum Journal*, 22(3), 317–335.
- Catling, S., & Willy, T. (2009). *Teaching primary geography*. Exeter: Learning Matters Ltd.
- Cochran, K.F., King, R.A., & DeRuiter, J.A. (1991). *Pedagogical content knowledge: A tentative model for teacher preparation*. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Corney, G. (2000). Student geography teachers' pre-conceptions about environmental topics. *Environmental Education Research*, 6(4), 313–329.

- Favier, T. (2011). *Geographic information systems in inquiry-based secondary geography education*. Amsterdam: VU University.
- Grossman, P. L. (1990). *The making of a teacher: Teacher knowledge and teacher education*. New York: Teachers College Press.
- Haubrich, H. (1992). *International charter on geographic education*. Freiburg: IGU.
- Kulke, E., Hemmer, I., & Schallhorn, E. (2007). *Educational standards in geography for the intermediate school certificate*. Berlin: Deutsche Gesellschaft für Geographie.
- Lambert, D. (2009). *Why subjects really matter: A personal view*. Retrieved from <http://www.geography.org.uk/gtip/thinkpieces/educationalpotential/>
- Lane, R., & Coutts, P. (2012). Students' alternative conceptions of tropical cyclone causes and processes. *International Research in Geographical and Environmental Education*, 21(3), 205–222.
- Loughran, J., Mulhall, P., & Berry, A. (2008). Exploring pedagogical content knowledge in science teacher training. *International Journal of Science Education*, 30(10), 1301–1320.
- Martin, F. (2000). Postgraduate primary education students' images of geography and the relationship between these and students' teaching. *International Research in Geographical and Environmental Education*, 9(3), 223–244.
- Martin, F. (2005). *The relationship between beginning teachers' prior conceptions of geography, knowledge and pedagogy and their development as teachers of primary geography* (Unpublished PhD dissertation). University of Coventry, Coventry.
- Martin, F. (2006). *Teaching geography in primary education, learning to live in the world*. Cambridge: Chris Kington Publishing.
- Martin, F. (2008). Knowledge bases for effective teaching: Beginning teachers' development as teachers of primary geography. *International Research in Geographical and Environmental Education*, 17(1), 13–39.
- Martin, F., & Owens, P. (2004). Young children making sense of their place in the world. In S. Scoffham (Ed.), *Primary geography handbook* (pp. 63–73). Sheffield: Geographical Association.
- Meijerink, H. (2012). *Een goede basis, advies van de commissie kennisbasis Pabo* [A strong basis, Opinion of the Commission Knowledge Base Primary Teacher Education]. Den Haag: HBO raad.
- Morley, E. (2012). English primary trainee teachers' perceptions of geography. *International Research in Geographical and Environmental Education*, 21(2), 123–137.
- Notté, H., & Baltus, R. (2011). Meester van mens en wereld. *Tijdschrift Voor Lerarenopleiders*, 32(2), 27–29.
- Notté, H., Van der Schoot, F., & Hemker, B. (2010). *Balans van het aardrijkskundeonderwijs aan het einde van de basisschool 4* [An overview of geography education at the end of primary school]. Arnhem: Cito.
- Ofsted. (2011). *Geography – learning to make a world of difference*. Retrieved from <http://www.ofsted.gov.uk/resources/geography-learning-make-world-of-difference>
- Sahlberg, P. (2011). Developing effective teachers and school leaders: The case of Finland. In L. Darling-Hammond & R. Rothman (Eds.), *Teacher and leader effectiveness in high-performing education systems* (pp. 13–21). Washington, DC: Alliance for Excellent Education and Stanford, CA: Stanford Center for Opportunity Policy in Education.
- Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 57(1), 1–22.
- Shulman, L.S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57, 1–22.
- Taylor, L. (2008). *Think piece: Concepts in geography*. Retrieved from [www.geography.org.uk](http://www.geography.org.uk)
- Turner-Bisset, R. (1999). The knowledge bases of the expert teacher. *British Educational Research Journal*, 25(1), 39–55.
- Van Bijsterveldt-Vliegthart, M. (2008). *Krachtig meesterschap, kwaliteitsagenda voor het opleiden van leraren 2008–2011* [Powerful mastership quality agenda for educating teachers, 2008–2011]. Den Haag: Ministerie van Onderwijs, Cultuur en Wetenschap.
- Van der Vaart, R. (2001). *Kiezen en delen. Beschouwingen over de inhoud van het schoolvak aardrijkskunde* [Selecting and sharing. Reflections on the content of school geography]. Utrecht: Faculteit Ruimtelijke Wetenschappen Universiteit Utrecht.

- Van Driel, J.H., Verloop, N., & de Vos, W. (1998). Developing science teachers' pedagogical content knowledge. *Journal in Research in Science Teaching*, 35(6), 673–695.
- Young, M. (2010). *Communicating public geographies*. Retrieved April 19, 2012, from Engaging Geography (<http://engaginggeography.wordpress.com/2-seminars/vi-communicating-public-geographies/>).