Student teachers' ideas on (powerful) knowledge in geography education

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ABSTRACT: This article discusses the ideas of Dutch student teachers about what kind of geographical knowledge secondary students should learn. We take into account the backgrounds of student teachers by comparing three groups in different teacher-education programmes. Their ideas are analysed using Alaric Maude's types of powerful geographical knowledge in the context of a F3 curriculum (explained by Maude in this journal in 2016). We observe a clear dominance of Maude's type 2 knowledge and a lack of type 3 knowledge, which is more or less in line with the (national) curriculum. Maude's (2016) types of knowledge are useful as a framework, but they also raise further questions. We conclude with a reflection on the PDK in Dutch geography education in particular, and the implications for teacher education in general.

Introduction

The idea for looking into student teachers' ideas on (powerful) knowledge in geographical education started from the outcomes of an earlier study (Béneker *et al.*, 2015). In one of their courses, Masters students in teacher education at Fontys University of Applied Sciences, Tilburg (The Netherlands), formulated a visionary statement about their ideal geography education in their schools in five years' time. These well-supported documents show that the student teachers' main concerns lay in pedagogical questions such as how can we achieve more active and enquiry-based learning? and how do we convince other (often more mature) colleagues to do so too? There was strikingly less attention paid to *what* they would like to teach and what their students should learn. The student teachers seemed to feel less agency for this, probably because of the focus on the national curriculum and high stake final exams in The Netherlands.

Therefore, we designed a new assignment whereby student teachers reflect explicitly on the knowledge part of (their) geography teaching in order to stimulate their thinking about their role as a curriculum maker instead of 'following' guidelines or becoming a 'slave' to a textbook series. The assignment consisted of a written essay around the following questions:

- What is geography education and why should we teach it?
- What should secondary students know from geography?
- What kind of geographical skills should they develop?
- What are the differences between the school subject and the academic discipline?

We used the assignment in a variety of teacher education programmes, and, in the remainder of this article, we analyse the outcomes of this assignment. We also look briefly at the supporting curriculum documents in the same manner, and discuss the impact the documents have on student teachers' knowledge.

Thinking about (powerful) disciplinary knowledge (PDK) is relevant for the current Dutch situation, because the Dutch curriculum renewal project (see Onsonderwijs website) asks for more cross-subject co-operation and integration. When thinking about the PDK (Maude, 2015, 2016), teachers are more able to situate their own subject in relation to

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Figure 1: *A typology of geography's five powerful knowledges. Adapted from: Maude, 2016.*

other subjects. In looking for a framework that we could use to analyse the student teachers' essays, we wanted to connect with the current debate on PDK in geographical education (especially in a Futures 3 curriculum, see Firth, 2011; Lambert *et al*., 2015; Uhlenwinkel *et al*., 2016). Until recently, ideas on how this PDK could be identified were stated in general or abstract terms, for example, 'the best we have', 'open to question', 'specialised' (Young, 2014); 'worthwhile and relevant', 'developing systematics in our thinking', 'deepening our perspective' and 'conceptual' (Lambert, 2014). Maude (2016) uses these more abstract ideas to unpick the meaning in order to relate it to geography education. He then tries to make the 'concept sufficiently concrete for teachers to recognise that some of what [they] already teach is powerful knowledge, or to identify opportunities in the curriculum to engage students with concepts in ways they might not previously have considered' (Maude, 2016, p. 70). Although our student teachers have not seen Maude's ideas, they could be specific enough for us to use when interpreting their essays.

Type of knowledge	Characteristics/comments
1. Knowledge that provides students with 'new ways of thinking about the world'	Using 'big ideas' such as: Place Space Environment Interconnection These are meta-concepts and are distinguished from substantive concepts, like 'city' or 'climate'.
2. Knowledge that provides students with powerful ways of analysing, explaining and understanding	Using ideas to: Analyse (e.g. place, spatial distribution) Explain (e.g. hierarchy, agglomeration) Generalise (e.g. push-pull models of migration, demographic transition)
3. Knowledge that gives students some power over their own knowledge	To do this, students need to know something about the ways knowledge has been, and continues to be developed and tested in the discipline. This is about having an answer to the question: 'how do you know?' It is an underdeveloped area of geographical education, but is a crucial aspect of 'epistemic quality' (Hudson, 2016).
4. Knowledge that enables young people to follow and participate in debates on significant local, national and global issues	School geography has a good record in teaching this knowledge, partly because it combines the natural and social sciences, and the humanities. It also examines significant 'nexus' issues, including food, water and energy security; climate change; and development.
5. Knowledge of the world	This takes students beyond their own experience – the world's diversity of environments, cultures societies and economies. In a sense, this knowledge is closest to how geography is perceived in the popular imagination. It contributes strongly to a student's 'general knowledge'.

Maude distinguishes five types of knowledge that refer to powerful geography (2015, 2016). Briefly, the first type of knowledge provides new ways of thinking about the world and refers to the 'big ideas' in geography such as place, space, environment and interconnection. These meta-concepts are distinguished from substantive concepts such as soil or city. The second type of knowledge provides powerful ways to analyse, explain and understand the world and consists of the tools we use for that: concepts, theories and models. The third type 'gives power over your own knowledge' and refers to how do we know? This type is to know something about the ways in which knowledge is developed and tested in geography. The fourth type of knowledge enables you to follow and participate in debates and deals with local, national and global issues (e.g. climate change, development, food and energy security). The fifth type Maude (2016) refers to is knowledge of the world: i.e. about the world's diversity and interconnectedness and could look like regional geography (see Figure 1).

The students who wrote the essays investigated below are part of different teacher education programmes and have different (disciplinary) backgrounds (see Figure 2). For the purpose of this research, we distinguish three groups:

- the first will become teachers after completing a Bachelors and a Masters in human geography or Earth sciences at Utrecht University (these we term Utrecht master);
- the second are a group completing a minor in geography education (part time for one year) within their three-year Bachelors programme in human geography and spatial planning or Earth sciences at Utrecht University (these we term Utrecht minor); and
- the third group are studying a more professional, integrated programme, consisting of a four-year Bachelors in geography education at Fontys University in Tilburg (these we term Tilburg bachelor).

The students formulated their ideas in a more or less similar course on subject-specific pedagogy. We then randomly selected 10 essays (assignments) per group from a total of 65 to analyse. (All students are numbered to preserve anonymity.) As we analysed the essays, we asked ourselves a series of questions:

- How do the students think about the role of geographical knowledge in their teaching?
- Can we recognise elements of powerful geographical knowledge?
- What type of knowledge?

Issue	Utrecht minor* student teachers	Utrecht master* student teachers	Tilburg bachelor* student teachers
Average age	20–22 years	22+ years	17–18 years
Stage in education	One-year (part time) teacher education programme during undergraduate studies in human geography and spatial planning or Earth sciences (taken in the second or third year of study).	One-year (full time) teacher education programme after the completion of a Masters programme in human geography or Earth sciences. With 20 European Credits in the other 'discipline' (human versus physical geography) required at undergraduate level.	Four years bachelor programme (full time) in teacher education immediately after secondary education has been completed.
Course composition	Internships (50%) - Subject-specific pedagogy - Educational science	Internships (50%) - Subject-specific pedagogy - Educational science - Research in education	Internships (30%) - Disciplinary courses: human and physical geography (30%) - Subject-specific pedagogy, educational science (30%)
No. of European Credits accumulated	30 (of 180)	60	240
Final degree enables student teachers to teach geography students in …	Lower secondary (when completing both minor and Bachelors programme) and pre-vocational education establishments.	All lower and upper secondary education establishments and vocational colleges.	Lower secondary education establishments.

Figure 2: *Students' average age, stage, course and teaching destination from the three teacher education programmes at the time of this investigation. Note: *see text for explanation of terms.*

- Do we observe any differences between the three groups?
- Is there a relationship between the student teachers' ideas and the national geography curriculum in pre-vocational, lower- and upper-secondary education?

The aims of this article are, on the one hand, to shed some light on the students perspectives on the powerful knowledge in their subject and the implications this may have for our teacher education; and, on the other, to see if and how it makes sense to use Maude's (2015, 2016) ideas. Maude tried to use his ideas to analyse the Australian geography curriculum. We wondered whether we could use them to look at Dutch student teachers' ideas and Dutch geography education.

Utrecht minor students

The students in the minor programme at Utrecht University study an undergraduate programme in human geography and planning or in Earth sciences. During their second or third years they can take part in the teacher-education programme for 1-year part-time (30 European Credits). They have an internship at a lower secondary school or a pre-vocational education establishment. These students are on an average 20–22 years of age. They get a degree for teaching in lower secondary and pre-vocational education as soon as they graduate.

The ten essays from this group show the most homogeneity. The student teachers' answers reflect very much what they have been reading in the handbook of geography teaching, or what is in the geography textbooks and curriculum. They are relatively inexperienced and stay close to the questions and the literature. They point at 'geographical awareness' as the aim of geography education, consisting of three elements: a substantial 'world knowledge', an understanding of (geographical) issues and procedural knowledge (geographical skills):

> *'I agree with the attainment goals of the curriculum.' [25]*
>
> *'To broaden their worldview into the far future.' [29]*
>
> *'Geography is one of the most important school subjects in order to explain everyday things and to understand for example the news.' [27]*

These student teachers do not reflect deeply on the geographical knowledge and content secondary

students should learn. They mention type 2 knowledge as 'concepts, processes, relations and (regional) contexts', but often without examples or more specific explanations. Geographical skills, especially map skills, are important tools to learn, as their comments indicate:

'to apply abstract knowledge and skills to the real world.' [23]

'thinking about concepts and processes when putting these in their own context.' [27]

Some are a bit more specific:

'you look at the history, culture, economic relations, but also at physical and chemist processes on Earth.' [31]

'by knowing how specific landscapes develop and change, how weather works and the structure of the Earth.' [22]

'inequality, cities, demography, globalization, tourism, plate tectonics, natural disasters, landscapes and rivers.' [25]

Other Utrecht minor students mention current issues and how geographical knowledge is related to the news. This might refer to type 4 knowledge:

'value laden themes as migration, poverty, trade and climate change.' [27]

'geography is suitable to refer to the news, it is topical and opinion formation can be linked.' [31]

Only one student referred to specific regional knowledge:

'to get a more specific image of their own region and the Netherlands and the position of the Netherlands in the world'. [28]

Utrecht master students

This student group is the most diverse: there are students who recently graduated from their Masters in human geography or Earth sciences, but others have had a different career or activities and decided to become a geography teacher at a later age. This teacher education programme is one-year full-time (representing 60 European Credits) and students spend half of the time in school for an internship. When students finish the programme they are allowed to teach in all levels of secondary and vocational education.

Looking at the writings of the Utrecht masters students, we find many references to becoming a critical, democratic (European, world) citizen and a person who can reason about issues of sustainability as important aims of geography education. Compared to the goals of education formulated by Biesta (2009), these students emphasise 'socialization', more than 'qualification' and 'subjectification':

'Geography is inseparable connected to citizenship because the subject is about the world outside and about the student's role in it. You need basic knowledge but the next step is even more important: awareness, getting connected and involved.' [9]

'In the end it should help students later on to be successful in their work and to make choices as a person and a citizen. Choices about the place they want to live, study, where to go on holiday, how to react to growing numbers of refugees or the need for international co-operation and how to vote.' [11]

The answers are more diverse in this group, perhaps reflecting their disciplinary backgrounds, work experiences and maturity. We can recognise all five of Maude's (2016) types of knowledge, except for type 3 – unless we count the one student teacher who mentions that in the classroom he often puts question marks against the 'selective' and sometimes 'biased' content of the textbooks, because, he says, it 'makes pupils think more critically'. However, this is not so much questioning 'how do we know as a discipline' but referring to the 'inadequacies' of the geographical information used. Compared to the other two groups these student teachers focus more on a regional approach and type 5 knowledge:

'A regional approach is more recognisable and concrete. Geography is about the knowledge of regions.' [10]

'You need to get acquainted with other parts of the world, in order to learn who we are and what kind of position we take. We should let them wonder about the diversity in the world.' [2]

'There are many regions invisible in the Dutch curriculum and textbooks.' [4]

These student teachers refer to the big ideas (type 1 knowledge) as well; and relational thinking is what they point at most:

'The relationship human – nature, referring to the role of people in "planning" space.' [11]

'To learn to look from interconnectedness, between phenomena within regions and between regions.' [6]

Tilburg bachelor students

These student teachers decided to start a geography teacher-education programme immediately after their own secondary education. Their four-year programme combines courses in human and physical geography with subject-specific pedagogy, educational science and internships (a total of 240 European Credits). The disciplinary knowledge in the courses is often related to the important topics in the geography curriculum in secondary education. Tilburg bacherlor student teachers get a degree for teaching in (pre)vocational and lower secondary education.

Again, we observe shared ideas about geography education in this group, but with more variation than in the Utrecht minor group. Their comments indicate the importance of geographical knowledge that will help young people understand the world and will stimulate a critical attitude towards information from the media, for instance:

> *'I think it is important that they know a bit from everything, some basic general knowledge. That when they watch the news on television with their parents, they can explain why we need to reduce our CO_2 emissions.' [19]*

> *'To create a supported opinion about themes dealing with the local and far away. They become aware that the Earth is a gift for everyone and we have to take care in a sustainable way.' [15]*

Type 2 is the most important, best-filled category in these Tilburg bachelor students' essays. The students seem literally to 'use' the knowledge they learn in their geography courses:

> *'The social composition of a neighbourhood, refugees, weather, all phenomena with causes and consequences of processes that are studied in geography.' [17]*

> *'Spatial issues can be answered by using different levels of scale, and by making relations between different actors.' [15]*

> *'Geography is not just about the "what" and the "where", even more about the combination of "where" and "why there".' [14]*

> *'They are able to explain "the weather in the Netherlands".' [19]*

Type 5 knowledge is mentioned twice, with arguments that we should take care with the representation of regions and countries in order to avoid stereotypical thinking and aim to consider multiple perspectives. One student made an interesting statement that refers to type 3 knowledge, which is even more significant when you consider this individual's non-academic background:

> *'Geography as an academic discipline is an empirical science, based on research. Where doubt is a big part of a scientific discipline, it is so absent in the school subject. Pupils (and teachers) like certainty and facts. Facts are easy to learn, and to transmit to students. Doubt is a complete different story… Learn to handle uncertainty or doubt and to do research are characteristics of the academic discipline, but hardly of the school subject. I think it is a pity and we need to change that.' [17]*

The student teachers and curriculum documents

When we combine the student teachers' comments in an overview (Figure 3), we see that two-thirds of them explicitly mention the type 2 knowledge that secondary students should learn in geography education, and half mention type 4 knowledge. A smaller group pays attention to the bigger ideas behind the discipline and only one refers to type 3 knowledge. In our analyses, we did not label the skills the student teachers mentioned, but many write about 'thinking skills' and 'map skills'.

Maude's knowledge type	Utrecht minor mentions (n=10)	Utecht master mentions (n=10)	Tilburg bachelor mentions (n=10)	Total (n=30)
Type 1	1	4	3	8
Type 2	8	6	7	21
Type 3	0	0	1	1
Type 4	4	6	5	15
Type 5	1	5	2	8

Figure 3: *Number of student teachers referring to Maude's types of powerful geographical knowledge in their assignments, by grouping.*

The question of whether these student teachers are prepared to deliver the national curriculum rests with the document itself. The lower secondary education curriculum document has a very vague character and the attainment goals are described for broader 'fields' as 'people/human and society' (Nieveen and Kuiper, 2012). There are a limited number of global aims with some references to geography with type 1 knowledge ('the relationship people – environment'), type 4 knowledge (issues) and type 5 knowledge (knowledge about the world, Europe and the Netherlands). However, these vague aims are elaborated in an 'exemplary geography curriculum', entitled *Leerplan in beeld,* by the curriculum organisation (SLO: Netherlands Institute for Curriculum Development, nd), but in reality, the

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publishers and editors of the textbook series design and deliver the curriculum in lower secondary education. Our impression is that in the textbooks there is – with of course a variety in series – a strong dominance of type 2 knowledge connected to issues (type 4) and regions (type 5). It is difficult to find references to type 1 knowledge, but in an implicit way 'environment' and 'diversity' are easier to find than 'place' as underlying concepts. Type 3 knowledge is, as far as we know, absent from the textbook series.

For upper secondary and the final year of pre-vocational education, where geography becomes an elective course, it is different. The programmes are documented in a syllabus with aims and selected, more elaborated, content. In pre-vocational education type 2 and type 4 knowledge dominate. In the exam programme, it is formulated as 'to describe, explain and compare'. Specific issues, such as energy, water, conflicts and the liveability of neighbourhoods, are indicated, and chosen regions are the contexts for applying concepts. For example, students study climate, climate change and policies in The Netherlands and compare it with Spain. In upper secondary education, relational thinking (type 1) is explicit, especially in making links between phenomena and between regions. For example, students study and compare the UK and India in global economic patterns and look into the effects of globalisation. Here, type 2 knowledge is recognisable in the use of sub-disciplinary knowledge like urban geography and physical geography. Issues, such as the world food problem and (global) climate change, are indicated in the programme. Regional knowledge is more important in the sense that one non-western region, Southeast Asia, is studied in detail. Type 3 knowledge is difficult to find.

When looking at the textbooks our impression is that 'world knowledge' (type 2 and type 5) dominates. Even with regard to issues such as climate change, most of the content is dedicated to type 2 knowledge rather than discussing the issue from a variety of perspectives or considering possible and preferable solutions and power relationships. Yet Maude (2015) claims that you cannot really discuss issues and form an opinion if you do not use any type 3 knowledge. For the Australian curriculum he wonders:

> '*whether students learn enough about the physical and human processes involved to be able to have informed opinions on these complex problems is debatable, given the limited time allocated to geography in schools. In addition, students need Type 3 knowledge if they are to be able to assess conflicting statements about these issues*' (2015, p. 23).

Our student teachers have clear ideas about geography education and how it should help school students be able to think critically about today's issues, but we wonder if they realise that this might be impossible when (only) focusing on the type 2 knowledge?

What student teachers mention as the core that the school students should learn in geography reflects the content of the curriculum and the textbooks in many ways. However, a few students do criticise the content of the geography education as well. For example:

> *'There are too many facts in our textbooks, for example about a countries' climate, natural landscapes, economy, political system, and it lacks attention for bigger issues in these countries. For example, I use at the moment a chapter about Russia in lower secondary education but there is nothing about the current economic and political power of Russia and for example their role in the region' [13]*

Conclusion and discussion

Investigating the work of these student teachers from the perspective of powerful geographical knowledge gives us food for thought. It is interesting to observe the similarities and differences between the three teacher education groups. The Utrecht minor group, in the middle of their undergraduate studies, face more difficulties reflecting on the school subject, because they have just learnt to get some control of their teaching and managing the processes in the classroom. The Utrecht master group can look from some distance to the school subject and the disciplinary knowledge. It would be helpful to discuss the literature and ideas of Maude on knowledge types (2015, 2016) with them more explicitly. The Tilburg bachelor group has spent many more hours on subject-specific pedagogy and reading and learning 'about' geography education. Therefore, this group is used to talking in type 2 knowledge, and go further by looking at issues from a critical point of view. Nevertheless, these student teachers face more problems in formulating their ideas and lack some writing skills.

We encountered a few 'problems' when working with Maude's typology. First, it was sometimes hard to distinguish between the different types of knowledge when looking at the students' work. This is linked not only to their limited way of explaining what they really mean, but also to the different 'types' themselves. For example, type 2 and type 5 both refer to 'world knowledge'; and

type 2 is a very 'big' category when looking at the practice of teaching geography. In his explanation, it takes Maude most of his article to describe the analytical concepts, explanatory concepts and generalisations. We wonder if the (geographical) skills our student teachers mention are part of this type of knowledge as well. Type 2, together with type 5, seems to be the vocabulary of our school subject. Another distinction, which is sometimes difficult to make, is between type 2 and type 4 knowledge. When students mention migration, for example, it is not always clear whether they are thinking of the use of related concepts to explain and understand migration or migration as an example of an EU issue. Of course, this has to do with the limitations of the students' work, but in practice these types of knowledge are used in an integrated way too.

More generally we might need to use all these knowledges in an integrated way to reach powerful knowledge and a Future 3 curriculum. Such a curriculum can be seen as an ideal that has the maximum educational potential. Teachers ought to be striving for it, and, thus, need type 3 knowledge as well. Teaching only type 2 knowledge might lead to a Future 1 curriculum (Young and Muller, 2010). We also need to consider whether there are gaps in the Dutch curriculum. Type 1 knowledge (the core concepts and thinking geographically) is implicit in the Dutch curriculum – with the emphasis on 'relational thinking' (people-environment, local-global) – but concepts such as 'place' are less so. More attention is paid to geographical ways of analysing, for example, the use of scales, comparisons and dimensions. Moreover, the Dutch curriculum lacks critical thinking concerning knowledge claims, models and theories in geography, differing in that respect from the International Baccalaureate programme. In the latter, students are stimulated to evaluate sources of geographic information in terms of accuracy, relevance and bias as part of their 'critical thinking skills' (IB, 2009, p. 18). For teacher education in The Netherlands, this raises a number of questions: do we introduce school students and student teachers to the complete range of geographical knowledge? Is our teaching of geography 'powerful' in a way that encourages young people to think critically and creatively? If not, and if our teachers cannot say how geography is powerful, the subject risks being side-lined as background 'stuff' or general knowledge that can be found via Google, and therefore has no place on the school curriculum.

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