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# The adoption of *Thinking Through Geography* strategies and their impact on teaching geographical reasoning in Dutch secondary schools

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The development of geographical reasoning is essential in geographical education. Strategies developed by the English *Thinking Through Geography* group (TTG) offer a promising approach to promote geographical reasoning. In the last decade, the TTG approach has become a regular element in geographical education in several countries. Research suggests that teachers acquainted with TTG do not always take full advantage of the possibilities of these strategies. The adoption of the TTG approach is explored ten years after its introduction in the Netherlands. Findings are presented of a survey conducted among Dutch geography teachers ($N = 307$) about the significance they assign to geographical reasoning and their use of TTG assignments. The results suggest that teachers use TTG selectively and adapt TTG assignments to fit them into existing practices and beliefs about students and teaching geography.

**Keywords:** geographical education; geographical reasoning; *Thinking Through Geography*; teaching strategies; professional development



## Introduction

One main goal in geographical education is to support the development of active and responsible citizenship, based on knowledge of and involvement in the surrounding world (Haubrich, 1994). Students should be able to use geographical knowledge to configure their own lives and use it to assess the desirability of situations, developments and solutions; and to decide how to act in various situations and in different places. An important prerequisite for achieving these aims is the development of geographical reasoning. In this study we define geographical reasoning as reasonable reflective thinking about the relationship between mankind and environment focused on deciding what to believe or do in situations where location matters.

In school, geographical reasoning can be promoted with a variety of pedagogical approaches. One possibility is using strategies developed by the English *Thinking Through Geography* (TTG) group. The TTG approach focuses on the development of both geographical knowledge and higher order thinking skills essential for analysing situations and developments – classifying, comparing, relating and evaluating – and for decision-making about such situations and developments. To achieve this, the TTG group developed geography lessons containing divergent exercises and encouraging collaborative group work between students and reflection on how tasks have been tackled (Leat, 1998).

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The TTG approach has been adapted by educational geographers in several European countries (Ehlers, Havekes, & Nolet, 2008; Nolet, 2005; Van der Schee & Vankan, 2006; Vankan, Rohwer, & Schuler, 2007; Vankan & Van der Schee, 2004 ). A number of early review studies on the adoption of 'thinking skills' strategies generally show that teachers appreciate these kinds of strategies as motivating and challenging ways to stimulate both their students' and their own thinking (Baumfield, Butterworth, & Edwards, 2005; Higgins et al., 2004; Higgins, Hall, Baumfield, & Moseley, 2005). These results were confirmed by research on the impact of a curriculum change in England, where the education of general thinking skills was integrated in subject-specific lessons (Department for Education and Skills, 2004, quoted in Leat, Van der Schee & Vankan, 2005). Similar findings were reported for Dutch geography teachers who participated in in-service training on TTG strategies (Leat, Van der Schee, & Vankan, 2005; Van der Schee, Leat, & Vankan, 2003).

However, the English and Dutch studies referenced also show that many teachers, when they begin to work with TTG strategies, fail to take full advantage of what these have to offer. One problem is that facilitating reflective discussions with students appears to be an obstacle for teachers. Reflection on learning activities and processes is essential for the transfer of knowledge and the development of self-regulation. However, teachers find conducting such discussions the most daunting part of the pedagogical change that teaching thinking requires (Leat & Lin, 2003; Leat et al., 2005). In an attempt to tackle this problem, various activities and guidelines to support teachers with 'debriefing' have been developed (Leat & Kinninment, 2000; Leat & Lin, 2003; Van der Schee & Vankan, 2006; Vankan et al., 2007). A second problem is the selective use of TTG strategies. Dutch geography teachers to whom TTG was introduced during in-service training adopted the easy to handle strategies far more readily than the more complex strategies (Leat et al., 2005). A possible cause for both these problems lies in teachers' professional background, specifically their pedagogical content knowledge and beliefs about their students and teaching geography (Leat & Higgins, 2002; Leat et al., 2005). During the last decade, TTG has gained influence in geographical education in several countries. In the Netherlands, a lot of teachers participated in in-service training on TTG. Nowadays, TTG is a regular element in Dutch initial teacher education and publishers inserted TTG-inspired exercises in their schoolbooks. Nevertheless, it is not clear if the problems mentioned above have been solved.

In this study, we explore the adoption of the TTG approach and its impact in teaching geographical reasoning in the Netherlands, 10 years after its introduction. We report the results of a survey conducted among Dutch geography teachers about their experiences using TTG-based exercises as tools for developing geographical reasoning. In contrast to earlier studies on TTG, this study involved a larger and more extensive sample and relates the use of TTG to differences in teachers' professional background.

## Theoretical background

### *Geographical reasoning*

Geographical reasoning is defined as reasonable reflective thinking about the relationship between mankind and environment focused on deciding what to believe or do in situations where location matters. This definition combines Ennis' classic definition of critical thinking – 'reasonable reflective thinking that is focussed on deciding what to believe or do' (Ennis, 1991: 6) – with geography. Critical thinking is, by this definition, an important part of problem solving. The last part of Ennis' definition emphasises the aim of

critical thinking. It should contribute to the ability of independent and argued decision making. The adjective 'reasonable' in the definition is used as elucidated by Ennis (1991, p. 6). It underlines that geographical reasoning presumes a consistent and logical way of thinking leading to conclusions based on explained assumptions and arguments. The conclusion can be an explanation, a prediction, a judgment about the validity of a statement, a statement about the desirability of an action, etc. Toulmin (2001) adds that reasoning is above all a process of searching for plausibility, which is constrained by time and place, and ethically charged. The conclusions are not always unambiguous and the aim has to be to decide which of the possible conclusions is most plausible and acceptable. 'Reflective' stresses the necessity of analysing and making judgments about the thinking process, including considerations about the implications of and possible alternatives for the frame of reference used. Key concepts in the geographical approach we use are the uniqueness, meaning, and interdependence of places and regions, the interdependence of geographical scales, the interaction between actors and social structures and the interaction between society and nature (Jackson, 2006; Knox & Marston, 2012; Massey, 2005).

Consistent geographical reasoning also requires an open-minded and inquisitive attitude, the ability to reason and to argue ('thinking skills'), geographical knowledge and metacognition. The first characteristic, an open-minded and inquisitive attitude, according to Ennis (1991) is characterised by a willingness to determine the core of a problem, to take a situation into account as a whole, to search for arguments and reasons, to search for alternatives and to waive a final conclusion if there are not enough arguments, reasons, or evidence. Paul and Elder (2002) stress that an open-minded attitude implies giving consideration to the input and interests of others. They distinguish 'weak' and 'strong' critical thinking. In weak or self-centred critical thinking, assumptions, and reasoning will only be analysed in order to derive arguments that may convince or manipulate others. Strong or fair-minded critical thinking, on the contrary, is grounded in a moral-ethical orientation focusing on a 'better world'. Second, geographical reasoning requires thinking skills such as identifying the core of the problem, assessing the reliability of sources, adding proposals, analysing arguments, formulating, adjusting and clarifying questions and countering arguments, and weighing the importance of arguments presented. An important aspect for all disciplines and school subjects, and thus for geography as well, is examining the origin and representation of information (Hannah, 2005; Harvey, 2005). An inquisitive attitude and cognitive thinking skills are the basic conditions for analysing or constructing an argument which fulfils the criteria of accuracy, completeness and clarity (Ennis, 1991; Facione, 2011; Paul & Elder, 2002). Third, solving a geographical problem requires geographical knowledge. Geographical knowledge contains an overview of the spatial differentiation on the earth's surface and distinguishing characteristics of places and regions and declarative knowledge (facts, concepts, theories) and procedural knowledge (skills, methods) as used in physical and human geography. It can be deepened by knowledge of particular cases. Finally, geographical reasoning requires the use of metacognition, roughly defined as regulation of and knowledge about one's cognitive activities involved in learning and problem solving (Veenman, van Hout-Wolters, & Afflerbach, 2006). According to Magno (2010), there is a significant correlation between critical thinking and metacognition.

### *Teaching and learning geographical reasoning*

It is argued that good reasoners are not just 'general problem solvers' who can apply cognitive strategies to various domains. High performers have domain-specific knowledge –

both generic domain knowledge and deeper knowledge of specific topics and situations. Their knowledge is organised in long-term memory in accessible ways and therefore easily retrievable for application. They also use a varied set of problem-solving strategies and have personal interest in the domain (Alexander, 2003, 2005; Anderson & Leinhardt, 2002; Bransford, Brown, & Cocking, 2000; De Jong & Ferguson-Hessler, 1996). Good performers take their time to examine available information, try to develop an understanding of the problem first, and recognise relevant patterns. They often think in terms of key concepts and theories. Poor performers, on the other hand, are more inclined to solve problems by making use of a limited number of heuristics and answers that fit their everyday intuitions (Alexander, 2003; Leat & McGrane, 2000; Leat & Nichols, 2000).

To ensure that students develop the necessary attitude and knowledge, we need challenging and divergent assignments which not only create opportunities to practice and acquire geographical knowledge, generic thinking skills and metacognition, but also encourage students to search for strategies that fit the task at hand and their own potential. For ensuring coherence in the knowledge and skills that are thus developed, it is important to incorporate the teaching of metacognitive activities into the learning material and to encourage students to reflect on their own problem-solving strategies. (Abrami et al., 2008; Alexander, 2003). TTG assignments offer these opportunities. We illustrate this with an example, based on an assignment in a Dutch TTG book (Vankan & Van der Schee, 2004, p. 98).

Imagine a family with two parents and some children. One of the parents can get an attractive job with a higher salary in another part of the country. The task for the students is to choose a new residence for the family. They receive a text about the preferences of family members, a selection of advertisements from real estate agents and an atlas. After a small-group discussion, a plenary discussion takes place about the results of this assignment, and strategies used in it. In this assignment, the geographical key concepts of place and spatial interaction are present. In the analysis, students can use concepts like urban, rural, location, distance, mobility, and accessibility. Furthermore, they must use maps to locate the possible residences and to compare the locations. The result is an overview of situational characteristics of the residences offered, including the location and the accessibility to other facilities important for the family. Efficient problem solving in this case requires metacognitive thinking about selecting an adequate strategy including an orientation on possible activities and their sequence. The students must ask themselves questions such as ‘What do we have to do first?’, ‘What does the given information tell us?’, ‘What do we need to know more?’ and ‘How can we get a good overview of the possibilities offered?’ Having an inquisitive attitude and being fair-minded means having the intention to search for a solution that does as much justice as possible to the concerns and wishes of all family members. It also means that students are willing to use exploratory talk in the sense of ‘talk in which partners engage critically but constructively with each other’s ideas’ (Mercer, 2000, p. 98). The task can be enhanced by inviting the students to examine the reliability of sources: what is the interest of house sellers and estate agents offering information? After finishing the task students should be able to reflect on the problem solving strategies used and the practicability of the approach for solving other geographical assignments.

TTG strategies vary in their level of difficulty to facilitate and implement. The more difficult strategies have a greater diversity of possible outcomes and require more transformation of the subject matter (Leat et al., 2005). Pedagogically, a complete TTG lesson consists of four stages: (1) introduction, (2) instruction, (3) task execution in small groups

and (4) reflective plenary discussion. The plenary discussion is the crucial element for enabling students to consolidate their learning and the transfer of knowledge to other contexts. It is advised to start the plenary discussion with a presentation of and discussion about possible outcomes of the assignment. This inventory should be followed by reflection on argumentation, strategies used or the possibilities for applying knowledge in other domains and contexts (Leat, 1998; Leat & Kinninment, 2000; Vankan & Van der Schee, 2004). Leat and Kinninment (2000) stress the importance of reserving time for this debriefing stage. We assume that for a plenary discussion going beyond the inventory of possible outcomes, at least 10 minutes are needed.

TTG lessons differ from lessons in a transmission mode by emphasising exploratory talk and reflection and require a more facilitating teacher role. The depth of the learning results of TTG assignments is strongly influenced by the teacher's efficacy, especially the competence to facilitate the plenary discussion (Leat, 1999; Leat & Lin, 2003; Leat & Kinninment, 2000). The extent to which teachers fulfil this role is based at least in part on the possibilities they perceive to shape their own educational practice. It is further influenced by their pedagogical content knowledge (Shulman, 1986), the educational system, and school culture (Fullan, 2007; Leat & Higgins, 2002). Research among geography teachers suggests that there is a relationship between teachers' understanding of geography, their academic background and teaching expertise (Brooks, 2006, 2010; Walshe, 2007). It seems plausible that geography teachers with a master degree in the subject have more complex knowledge of geography than teachers with a bachelor degree related to geography. We may therefore expect that the higher educated teachers with a geography related master degree will use more complex TTG strategies, which will more often include facilitating reflection. It is also argued that there is a relation between teaching experience and involvement with educational change (Hargreaves, 2005; Steffy & Wolfe, 2001). According to Hargreaves (2005), beginning teachers have to focus on the core tasks of teaching, but are also active and enthusiastic. Mid-career teachers still look for opportunities to spice up their lessons, but are selective in adapting change initiatives. Senior teachers are skilful practitioners, but may under the influence of former experiences and educational reforms become resistant to educational change. All of these are good reasons to examine if the use of TTG is influenced by differences in teachers' career stages.

This study explores to which extent TTG is actually used as an approach to promote geographical reasoning. Indicators used in this study are the degree of teachers' familiarity with it, their frequency of use and selection of TTG strategies; the goals pursued and their pedagogical motives for using TTG; and the time spent on distinct stages of TTG lessons, especially on plenary discussion. In addition, this study investigates whether the importance assigned to geographical reasoning and the use of TTG assignments depends on the educational level of the students taught, and whether this is related to academic background and teaching experience of the teacher.

The research questions are as follows:

(1) What significance do Dutch geography teachers assign to (different aspects of) geographical reasoning at different levels of secondary education?
(2) Which kinds of TTG strategies are used by Dutch geography teachers and what are their reasons to use or to disregard these strategies?
(3) Are the TTG strategies deployed as intended in the theory behind TTG?
(4) Is the selection of TTG strategies and the way they are used related to teachers' academic backgrounds, their teaching experience and/or the educational level of their students?

## Method

### *Data collection and analysis*

This study is based on the results of a questionnaire conducted in 2011 among Dutch geography teachers.

To answer the first research question, we asked: (1) to what extent geographical reasoning is perceived to be important for students at various levels of education; (2) how often time is spent in the classroom on elements of geographical reasoning; (3) which teaching strategies are used and (4) which difficulties are experienced when teaching geographical reasoning.

In relation to the second research question, we attempted to gain insight into which TTG assignments and strategies are used or disregarded and for which reasons. Questions were asked about familiarity with the TTG approach, frequency of use of various assignments during one school year, goals pursued and pedagogical motives for use. The TTG strategies are classified into eight groups, based on their geographical content and level of complexity: (1) describing and relating concepts, (2) recognising and using concepts in real-life situations, (3) analysing and interpretating maps and graphs, (4) analysing and interpretating photos, movies and stories, (5) analysing regions, (6) analysing spatial problems or developments, (7) opinion forming and (8) making and justifying decisions. The first four strategies focus on basic geographical knowledge and fit rather easily in existing beliefs and practices. The other strategies are more complex, as they are more divergent and appeal more to integrating knowledge during problem solving.

For answering question 3 we asked how much time is typically spent on the different stages of a TTG-based lesson and which difficulties teachers experienced in TTG-based lessons.

Finally, we asked for the following respondent characteristics: age, school location, academic degree, teaching experience and educational level of the students.

In total, the questionnaire contained 26 multiple choice and scale questions. The scale questions consisted of statements with the question to what extent the statements apply to respondents' practices. The statements are assessed in a four point Likert scale (1 = agrees not at all, 4 = agrees completely).

We evaluated the cognitive complexity of each question individually using the Task Difficulty Test (Van der Van der Zouwen & Dijkstra, 2002). The questionnaire was pretested using a panel of teacher educators and geography teachers, focusing on the clarity of the questions.

The questionnaire was announced in the digital newsletter of a large online community of geographical educators. The online questionnaire provided a stream of incoming data which could be automatically stored. The data were initially analysed on a descriptive level. Frequencies, means, and standard deviations were calculated. Then, several tests (chi-square, Cramérs V and Spearman's rank correlation) were run to explore correlations between variables. Correlations are regarded as significant if $\alpha < 0.05$. Only significant correlations are reported.

### *Response*

467 Respondents started answering the questionnaire. Ultimately, we received 340 completed questionnaires from at least 81 schools. The response originated from all regions in the Netherlands. Considering the findings of Shih and Fan (2008) and Mertler (2003), we take this as an acceptable response and a fair, although not completely representative

share of the 4722 teachers involved in geographical education (including teachers who are not certified for teaching geography) in the 646 Dutch schools for secondary education (Dienst Uitvoering Onderwijs, 2013). Using the online community as the sample framework we might have attracted a slightly more active and engaged part of the Dutch geography teachers. Nearly all respondents (89.3%) who fulfilled the questionnaire have a master or bachelor degree related to geographical education. The others are undergraduates, are educated for teaching another subject or for teaching in primary education or have not completed any teacher education programme. We restricted the analysis by selecting the 307 respondents who completed the questionnaire and have a master or bachelor degree related to geography and geographical education.

Table 1 shows that the relatively large number of respondents with a master degree is related to the educational level at which the respondents are teaching. In this study, we distinguish four levels of secondary education in the Netherlands:

(1) A: upper pre-university and higher general secondary education (grades 10, 11, 12);
(2) B: lower pre-university and higher general secondary education (grades 7, 8, 9);
(3) C: grades 7−10 of theory-based prevocational education;
(4) D: grades 7−10 of practice-oriented prevocational education.

Table 1 also illustrates that it is common in the Netherlands for a teacher to teach at multiple levels of education. Therefore, the percentages add up to more than 100%. Two-thirds of the respondents teach at level A and three in four teach at level B. Nearly half the respondents work at level C. There is an underrepresentation of teachers working at level D. Nearly all of the 182 respondents with a master degree teach at levels A and/or B. A minority of them teach also at level C and/or level D. About one in three of the 125 respondents with a bachelor degree teach at level A, but the majority teach at the B and/or C levels, while about one in four teaches at level D.

The number of years of experience is on average 15.9 years, ranging from 1 to 42 years. Respondents with a master degree are typically more experienced with a mean of 17.6 years and those with a bachelor degree less experienced, the mean being 13.5 years. Based on teaching experience, respondents were classified in five groups: beginning teacher (1−5 years), beginning professional (6−10 years), professional (11−20 years), advanced professional (21−30 years) and senior (>30 years). Interestingly, more than half, i.e. 57.0% of the respondents, can be classified as at least a 'professional', while the proportion of 20.5% of beginning teachers is balanced by the 17.9% of senior teachers. The difference in

Table 1. Academic level of teachers ($n = 307$) and educational level of students, in per cent.

| | | Students' educational level | | | |
|---|---|---|---|---|---|
| Teachers' academic level | *n* | A: upper pre-university and higher general secondary education (grades 10, 11, 12) | B: lower pre-university and higher general secondary education (grades 7, 8, 9) | C: grades 7−10 of theory-based prevocational education | D: grades 7−10 of practice-oriented prevocational education |
| MSc/MEd | 182 | 96.7 | 83.0 | 30.2 | 10.4 |
| BSc/BEd | 125 | 29.6 | 69.6 | 76.0 | 24.0 |
| Total | 307 | 69.4 | 77.5 | 48.8 | 15.9 |

experience between bachelors and masters is the result of a large number of advanced professionals and senior teachers in the latter group.

## Results

In the following sections, the results for the first three of our research questions are presented. Results for question four are integrated in these sections. For each question, the most important results are presented in tables and figures.

### *Significance assigned to geographical reasoning*

The questionnaire opened with a detailed operational definition of geographical reasoning: 'A student can reason geographically, if (s)he can make a plausible statement about the properties and location of a phenomenon, its relationships with other phenomena or areas, its genesis or impact on future developments and, if relevant, can voice an argued opinion on the desirability of the situation or development, through observing, questioning, analysing and interpreting the landscape, maps, photographs or other sources'. After this definition, we asked respondents to indicate the importance of learning to reason geographically for students at previously specified educational levels on a 4-point scale, with a possibility for ticking on 'no statement'.

Table 2 shows that almost all respondents made a statement about the importance of learning geographical reasoning for students on level A or B. Considerably fewer respondents made judgments for levels C and D. The considerable amount of no-statement responses may be based on reluctance to judge educational practices without prior teaching experience at that level. The remaining responses show a clear tendency: the higher the educational level, the more importance teachers attach to learning geographical reasoning. The respondents are almost unanimous in their judgments about the importance of geographical reasoning for the highest educational level. Concerning the importance for the lower levels there is some more difference of opinion.

Responses regarding time spent in class on geographical reasoning also indicate differences between the educational levels distinguished. Four out of five (79.0%) respondents teaching at level A report that they pay attention to geographical reasoning in at least 25% of their lessons and 44.9% say that they do so in more than 50% of their lessons. On

Table 2. Importance assigned by teachers ($n$ = 307) to learning geographical reasoning for students at four educational levels.

| | No statement | | Statement | | |
|---|---|---|---|---|---|
| Students' educational level | Abs. | Perc. | $n$ | Mean* | SD |
| A: upper pre-university and higher general secondary education (grades 10, 11, 12) | 15 | 4.9 | 292 | 3.88 | .331 |
| B: lower pre-university and higher general secondary education (grades 7, 8, 9) | 14 | 4.6 | 293 | 3.26 | .610 |
| C: grades 7–10 of theory-based prevocational education | 65 | 21.2 | 242 | 2.93 | .766 |
| D: grades 7–10 of practice-oriented prevocational education | 114 | 37.1 | 193 | 2.25 | .794 |

*Low–high 4-point Likert scale, 4 = high importance.

the contrary, more than half (54.8%) of the respondents teaching at level D pay attention to geographical reasoning in, at most, 25% of their lessons. There is a slight correlation between respondents' academic level and the percentage of lessons with attention to the use of geographical methods ($r_s = 0.23$, $p < 0.01$, two tailed) and thinking skills ($r_s = 0.20$, $p < 0.01$, two tailed). Apparently, teachers consider learning geographical reasoning as more feasible and desirable for students at higher education levels than those at lower levels.

Figure 1 offers an overview of the attention paid during lessons to several elements of geographical reasoning. Not surprisingly, there is much attention for geographical knowledge, especially for geographical concepts and theory. 85.7% of the teachers report that they do so regularly and 59.0% even frequently. Other geographical contents on which many respondents spend lesson time regularly are geographical information (analysing maps and graphs: 56.4%; analysing photos, movies and texts: 41.7%), geographical methods (44.0%) and characteristics of places and regions (43.3%). Furthermore, more than half of the respondents (52.4%) spend time at least regularly on thinking skills. On the other hand, more than half the respondents (52.2%) give attention to formulating geographical questions at best occasionally. The attention for reflection on consequences of the outcomes of reasoning is really limited. 59.3% of respondents report that they

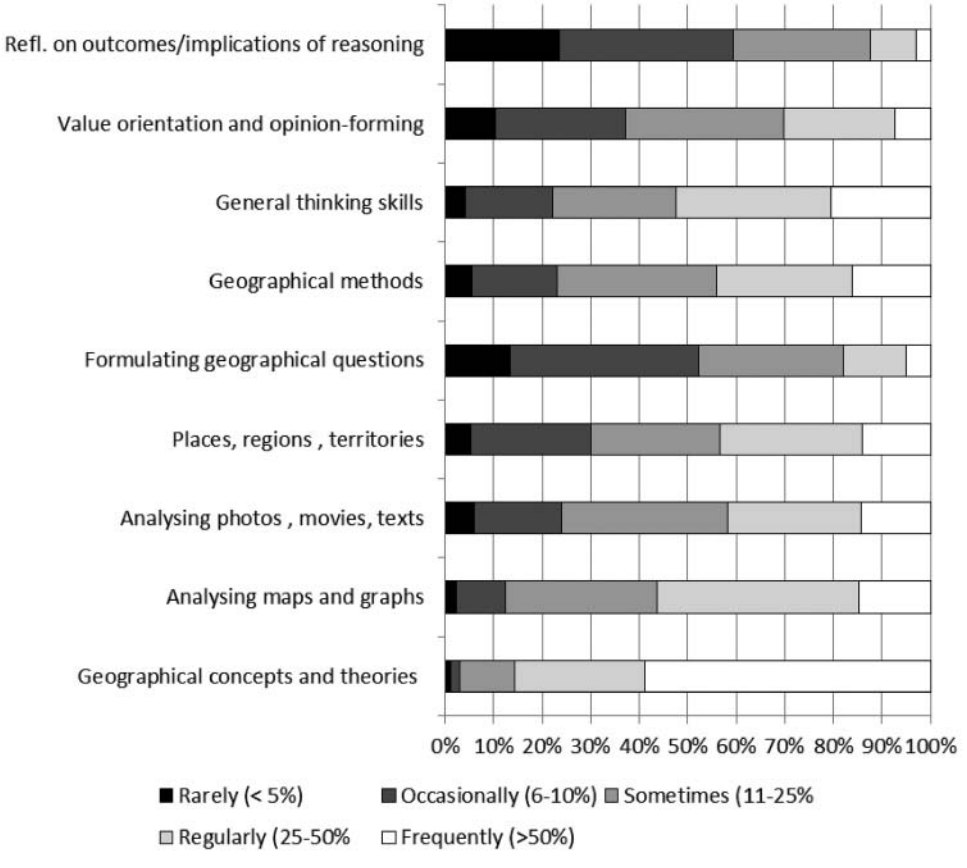


Figure 1. Proportions of respondents ($n = 307$) reporting the frequency of lessons in which attention is given to specific elements of geographical reasoning, in per cent.

spend time on this at most occasionally. Time spent on values varies strongly. Nearly one out of three teachers (30.6%) pays attention at least regularly to values and more than one out of three (37.1%) does so at best occasionally. These results suggest that geographical reasoning is primarily approached as searching for logical and consistent answers to given geographical questions, with restricted attention for underlying values and without addressing possible consequences of outcomes.

In addition, differences were found between the educational levels. On levels B, C and D more than half of the respondents reported that they pay some attention to geographical methods, while on level A, the majority report that they do so regularly. There is a slight correlation between respondents' academic level and the percentage of lessons with attention to the use of geographical methods ($r_s = 0.23$, $p < 0.01$, two tailed) and thinking skills ($r_s = 0.20$, $p < 0.01$, two tailed).



### *Strategies and problems*

At all levels, teaching geographical reasoning is interwoven into the curriculum. The most reported moments are the lessons in which pupils are prepared for tests or exams (77.9% agrees largely until completely) and lessons focusing on geographical research by students (73.0%). About two thirds of respondents go along with 'when there is a specific section on it in the course book' (69.7%) and 'during discussions about assignments and homework' (60.3%). The most used teaching strategy for promoting geographical reasoning is working with assignments as given in the course book (76.9%), followed by facilitating whole class discussions on given assignments (54.4%) and scaffolding individual students ( 50.2%). There is less use of teaching strategies such as modelling, (44.0%), argument mapping and structuring (39.7%) and collaborative small-group discussions about a geographical problem (28.3%). It seems that the attention given to geographical reasoning is apparently largely driven by the content of the course book.

As regards difficulties related to the teaching of geographical reasoning, we consider a statement as an experienced problem if more than 40% of respondents largely agree. There is very little support for statements in which the knowledge of the teacher is questioned. The only problem experienced that is independent from student characteristics is a lack of time (40.5%). Problems are basically seen as due to students' characteristics. The reported problems have to do with both general and geographical knowledge of the students. Most mentioned are students' inability to think and argue logically (64.3%) and expressing a line of reasoning in appropriate ways (65.8%). Furthermore, nearly half the respondents endorse that students have a lack of general knowledge (48.8%) and that reading texts is problematic (50.7%). Regarding geographical knowledge, the use of a geographical approach seems to be the main point. Almost three quarters (72.9%) report the formulation of geographical questions by students as problematic. More than half the respondents report problems with the use of geographical methods (59.6%), analysing maps (45.6%) and too little knowledge of places and regions (42. 2%).

### *TTG strategies used*

A decade after its introduction, TTG is more or less known among eight out of ten respondents (84.0%). There is a small negative correlation between teaching experience and familiarity with TTG ($r_s = -0.17$, $p < 0.01$, two tailed). TTG is most known by the beginning teachers and least known by the professionals. Slightly more than half of the respondents (55.4%) use one or more TTG assignments at least once a year.

Among those familiar with TTG, two out of three (67%) are users. TTG, then, has become a well-known and regularly used approach in Dutch geographical education. However, the use of TTG is not self-evident. There is a small negative correlation between teaching experience and use of TTG ($r_s = -0.18$, $p < 0.01$, two tailed). 80.3% of beginning teachers use TTG assignments versus 44.4% of advanced professionals. We did not find an obvious reason for not using TTG other than experiencing lack of time: 52.8% of the non-users agreed largely with the statement 'TTG requires too much time and interferes with the regular programme'. Further analysis focused on the remaining 171 users of TTG. At all educational levels, the majority uses a TTG assignment one to five times in one class during one school year. TTG is least used at level D and most at level B.

In the questionnaire, TTG strategies were classified into the aforementioned eight groups.

Figure 2 shows the teachers' familiarity with and use of types of assignments during one school year. The TTG strategies used most frequently are the ones that focus on basic geographical knowledge: using geographical concepts and sources with geographical information like maps, graphs and photos. There is little use of more complex and integrative assignments that aim at opinion-forming or analysis of regions or spatial problems. This emphasis on basic knowledge is independent of educational level and the professional background of respondents. There is only a small negative correlation between academic background and the use of strategies related to recognising and applying concepts ($r_s = -0.24$, $p < 0.01$, two tailed).

The top three aims pursued confirm an emphasis on concepts and information skills. Most mentioned are 'learning the meaning of concepts' (46.2%), 'analysing maps, graphs, photos or texts' (45.0%) and 'using concepts and theories for problem-solving' (40.9%). As to the relation between professional background and pursued goals, there are two small negative correlations. Teachers with a bachelor degree reported 'dealing with sources' more often than those with a master degree ($r_s = -0.23$, $p < 0.05$, two tailed). Beginning teachers mentioned 'stimulating empathy and involvement' more often than more experienced respondents ($r_s = -0.18$, $p < 0.05$, two tailed). By far the main pedagogical motive for using TTG is 'variation in lessons' (64.9%), followed by 'motivating and challenging students' (40.9%) and 'practicing concepts' (40.4%). More experienced teachers reported 'stimulating active and independent learning' more often as an important pedagogical motive ($r_s = 0.21$, $p < 0.01$, two tailed).

### *Orchestrating a TTG lesson*

Figure 3 shows that, considering their most used type of TTG strategies, almost all respondents structure TTG lessons as intended in the theory behind TTG, which is according to the stages indicated by the TTG group. Most time is spent on having students carry out assignments. No clear-cut time schedules are in use for TTG lessons. The findings about the plenary discussion may be interpreted in multiple ways. On the one hand, more than half of users (61.4%) reported debriefing sessions with a maximum of 10 minutes, i.e. less than the time supposedly required for a discussion going beyond the possible answers of assignments. On the other hand, one out of three teachers (37.5%) reported plenary sessions of 10 till even 20 minutes. The data do not give insight in the topics discussed during whole-class discussions and the quality of the conversation.

Answers to the question which difficulties teachers experience while facilitating TTG lessons cannot be derived unambiguously from the data. Regarding student characteristics

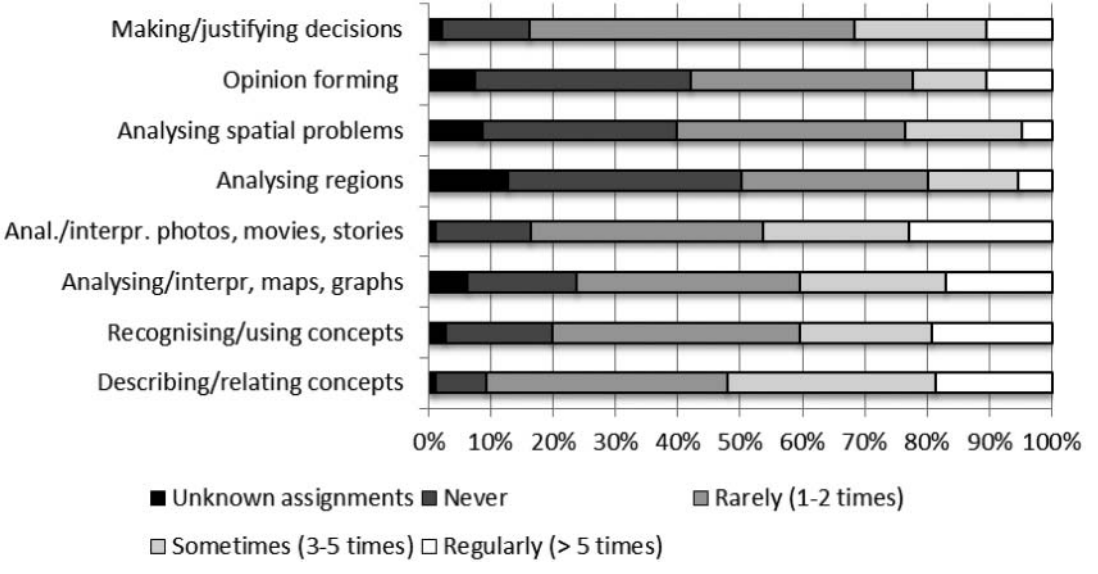


Figure 2. Proportions of respondents ($n = 171$) reporting familiarity with and use of TTG strategies during one college year, by type, in per cent.

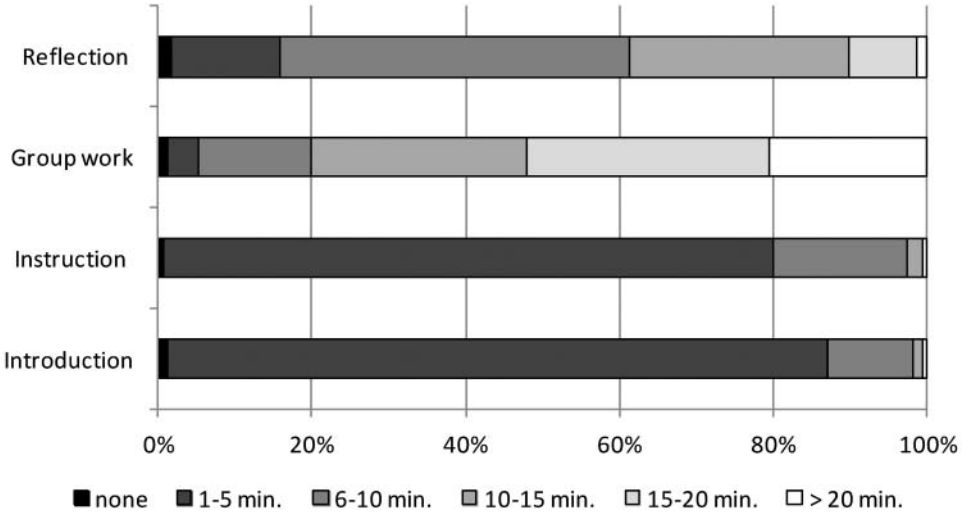


Figure 3. Proportions of respondents ($n = 171$) reporting amount of minutes spent on stages of a TTG lesson, in per cent.

and their own pedagogical knowledge more than half to three quarters of the respondents answered that they slightly agree that there is a problem. 'Lack of time' is the most prominent difficulty; 40.2% agrees mostly. Concerning plenary discussions three out of four teachers reported that they have few or no problems with keeping track of discussion contents. 25.1% agreed mostly with the statement that it is difficult to motivate the students for it.

## Conclusion

This study indicates that a decade after its introduction, TTG is a well-known approach in geographical education in Dutch secondary schools. However, the impact of TTG on the actual promotion of geographical reasoning, as defined previously, appears limited. The results concerning our first research question show that insofar as there is attention during lessons for geographical reasoning, teachers tend to focus on logical and consistent answers from their students to given geographical questions, with limited attention for underlying values and reflection on consequences of outcomes. Teaching geographical reasoning comes in different ways and moments on the agenda, but it seems to be strongly influenced by what the course book offers. The main experienced problems are a lack of thinking skills and literacy and insufficient knowledge of the use of geographical methods by students and a lack of time.

There is a broad belief among respondents that learning to reason geographically is more important for students at higher levels of education than for those at lower levels. This belief is reflected in differences in the time spent on geographical reasoning at different educational levels, but hardly in differences in the use of TTG strategies. TTG is used somewhat more on the B level and less on the D level, but overall there are few differences in the use of TTG strategies. The larger amount of time spent on geographical reasoning at the highest educational level is not recognisable in a greater or different use of TTG assignments.

TTG-inspired assignments have become a common element in the repertoire of many Dutch geography teachers, but TTG is not used really frequently and the use of TTG is not self-evident. Slightly more than half the respondents use TTG assignments. The composition of our sample might even have led to some overestimation of TTG use, as one may expect it to consist of relatively engaged teachers.

This study confirms the results of earlier research about the selection of TTG strategies (Leat et al., 2005) in the sense that integrative, more complex assignments are used less often than easier strategies. The main motive for using TTG is stimulating and motivating students. Concerning content, the emphasis is on teaching and learning basic geographical knowledge and to a lesser extent on the development of thinking skills.

The results about structuring and orchestrating lessons suggest that a majority of respondents try to use TTG assignments as intended in the theory behind TTG. It is quite understandable that most time is spent on execution the task. However, based on the time used for plenary discussions, it looks plausible that in two out of three TTG lessons the focus is on carrying out the task and discussing the outcomes, with little, if any, attention for topics related to metacognition or transfer of knowledge to other contexts. However, as the exact topics discussed during the plenary sessions were not investigated, it cannot be ruled out that in these lessons some attention is paid to metacognition and transfer of knowledge.

The findings from this study are applicable to all the educational levels distinguished and appear to be unrelated to the respondents' professional backgrounds. Based on available evidence (Brooks, 2006, 2010; Walshe, 2007), we expected that higher educated teachers would use more complex TTG strategies and be more focused on facilitating reflection. Respondents with a master degree do indeed focus somewhat more on geographical methods and thinking skills than respondents with a bachelor degree, but there are no significant differences in the deployment of TTG related to academic background. In line with the results of Hargreaves (2005), there are some indications that beginning teachers are more familiar with and use TTG assignments somewhat more often than mid-career and late-career respondents, but overall, the practices described are characteristic of the entire sample. This is in line with the respondents' goals and motives for using TTG. Their main focus is not on their students' learning geographical reasoning, but on teaching basic geographical knowledge and spicing up lessons. This type of deployment of TTG may also explain that respondents report that they have hardly any problems with performing a TTG lesson. This finding is in contrast with previous research indicating that the reflection stage in particular is experienced as difficult (Leat & Lin, 2003; Leat et al., 2005), but fits with the idea that carrying out the assignment and making an inventory of the answers constitute the core of the lesson. Fullan (2007) argues that educational change consists of three aspects: the use of new materials, the use of new teaching approaches and an alteration of beliefs. It seems that TTG in the Netherlands is for the most part restricted to the use of materials, without consideration of the deeper implications.

## Discussion

To achieve a more effective use of TTG, the reasons why teachers do not use the more complex strategies more often and their interpretation of plenary discussions should become clear. To come up with solid answers we need to know more about what actually happens in the classroom and teachers' motives to act as they do. However, the results at

hand do offer ground for formulating some possible explanations, matching with notions from implementation theory (Spillane, Reiser, & Reimer, 2002; Fullan, 2007).

A first group of possible explanations has to do with the existing cognitive structures (including knowledge, beliefs and attitudes) of the respondents and their interpretation of TTG strategies. The preference for easier to implement assignments focusing on concepts and skills may be based on beliefs about how geography should be taught and learned: learning initially the basic declarative and procedural knowledge (knowing what and how), then learning to solve complex geographical issues.

Second, there is the social and organisational context in which many teachers work. Beliefs and practices are influenced by the opinions of school management, colleagues, students and parents. The amount of time a TTG lesson requires is the most frequently reported problem in using TTG. A standard lesson in the Netherlands lasts 50 minutes. In the perception of teachers, that is probably too little time for giving the necessary attention to all elements of a TTG lesson. Furthermore, teachers can experience pressure from the national curriculum. In the last decade, there has been an increased focus on assessing basic knowledge.

A third factor can be uncertainty and a lack of pedagogical content knowledge among teachers. Geographical reasoning can be complex and is often ethically charged. It assumes a lot of geographical knowledge and sometimes also knowledge from other disciplines, e.g. historical or economic information. The conclusions are not always unambiguous. These may be reasons for teachers to shy away from more complex assignments. Adoption of new teaching approaches and beliefs is not easy and makes every teacher more or less a novice (Leat, 1999; Steffy & Wolfe, 2001).

As mentioned before, the sample cannot be considered completely representative. In addition, the results are based on self-report. Therefore, we remain slightly reserved in extrapolating the results. However, the questionnaire data do provide a feasible approximation of a nationwide state of affairs. The results can therefore be taken as an important indication for the use of TTG in the Netherlands. It is plausible, then, that a decade after its introduction, we see a superficial implementation of TTG at all educational levels. We conclude that so far, the potential of TTG as a method for promoting geographical reasoning is not fully exploited.

For a better understanding of the extent to which the factors mentioned above play a role in the use of TTG, additional research is required focusing on teachers' interpretation of specific TTG assignments and their facilitation of these assignments in the classroom.



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