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Inquiry-based working by school boards, school leaders and teachers and students' inquiry habit of mind

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CHAPTER 5

Promoting inquiry-based working: exploring the interplay between school boards, school leaders, and teachers[4]

Abstract

Inquiry-based working contributes to teacher professionalization and educational improvements. This article presents the key findings of a qualitative case study carried out in three primary schools in the Netherlands. That study focused on the inquiry-based working of school boards, school leaders, and teachers, with the goal of better understanding how schools establish an inquiry-based culture. As a follow-up to a nationwide survey, this case study used semi-structured interviews, observations, and document analysis to gain insight into the interplay between school boards, school leaders, and teachers regarding inquiry-based working. It identified multiple ways in which educators can encourage others to work in an inquiry-based manner. These approaches are not only top-down (i.e., from school board to school leader, and from school leader to teacher) but also bottom-up (i.e., from teacher to school leader, and from school leader to school board).

Keywords: inquiry-based working, inquiry-based leadership, culture of inquiry, school board, school leader, teacher

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Introduction

Inquiry-based working has become increasingly important in education. In the span of a few decades, our society has shifted from an industrial model to a knowledge-based one, thanks to globalization, the internationalization of the economy, and new information and communication technologies (Voogt and Roblin, 2012). At the same time, increased autonomy for schools has emerged as an international trend. Schools have more policy space and freedom to make their own decisions, but this greater autonomy also means that they are increasingly held accountable for student achievements (Krüger and Geijsel, 2011). To provide direction in this new era, demand is growing for internal and external data providing insights into the effectiveness of teaching and school practices (Krüger, 2010; Schildkamp, Ehren and Lai, 2012; Vanhoof, Vanlommel, Thijs, and Vanderlocht, 2014). Using data as the basis for school improvement implies that school leaders and teachers engage in collaborative inquiry and that they base educational decisions on its results. In addition to using data to improve schools themselves, school leaders have another new role: guiding a culture of inquiry in which teachers utilize data to understand the effects of their actions, act on their learning, and share their findings with others (Earl and Katz, 2006). This also means that school boards are tasked with encouraging school leaders to create this type of culture in their organization.

Although evidence has demonstrated that data use on the part of school leaders and teachers leads to educational improvements that support student achievements (Campbell and Levin, 2009; Datnow, Park, and Kennedy-Lewis, 2013), little is known about how schools establish a culture of inquiry. In addition, literature is lacking on how educators at different levels of a school organization influence each other's inquiry-based working (Schildkamp et al., 2012). Since collaboration is an important aspect of working in a culture of inquiry, it is important to take into account the two-way interaction between educators at different levels of a school organization. Existing research has focused on questions concerning how leaders and leadership practices affect the performance of teachers and students (e.g., Anderson, Leithwood and Strauss, 2010; Park and Datnow, 2009; Schildkamp et al., 2012). Other studies have investigated the influence of district leaders or school boards on educational quality (e.g., Hooge and Honingh, 2014; Wayman, Jimerson and Cho, 2012) or the effect of school boards on student learning (e.g., Lee, Seashore Louis, and Anderson, 2012). None of these studies, however, have emphasized the two-way interaction between school boards and school leaders, or between school leaders and teachers. Specifically, no research has evaluated the potential influence of teachers (school leaders) on the inquiry-based working of school leaders (school

boards). This study sought to better understand the interplay between school boards, school leaders, and teachers regarding inquiry-based working. A case study was conducted at three schools. At two of these institutions, school leaders and teachers gave themselves high scores on inquiry-based working, while at the final school, they assigned themselves average scores in that area.

Conceptual framework

A culture of inquiry

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Schools with a culture of inquiry are more conscious of their educational quality, can better perceive weak spots in the instructional process, and make more focused adjustments for educational improvement (Krüger, 2010). This type of school is committed to challenging existing beliefs and practices, as well as to using data to improve education (Earl and Katz, 2006). According to Robinson and Lai (2006), education should be based on high-quality data and tested assumptions about what children need to learn effectively. In such schools, school boards, school leaders, and teachers invest a significant amount of time and energy into making data accessible and training teachers to become data literate (Schildkamp, et al., 2012).

Although the data-literacy skills are important for educators to possess (Daly, 2012; Earl and Katz, 2006; Wayman, 2013), this study focused on the broader concept of inquiry-based working, which goes beyond using data and being data literate. Based on Earl and Katz (2006), we define educators' inquiry-based working as (1) having an inquiry habit of mind, (2) being data literate, and (3) creating a culture of inquiry in school. Having an inquiry habit of mind means valuing deep understandings, reserving judgment, considering a range of perspectives, and systematically posing increasingly focused questions (Earl and Katz, 2006). It includes having an inclination to achieve (being passionate and persistent), an inclination to know (being curious and excited), an inclination to understand (having overview and wanting to scrutinize), and an inclination to be critical (being honest and critical of one's self and others; Van der Rijst, Kijne, Verloop, and Van Driel, 2008). While being critical sometimes has negative connotations (i.e., being judgmental), this paper uses the term to describe the positive and well-reasoned examination of ideas.

Data literacy refers to transforming data into information, and then into knowledge, and finally into action (Marsh and Farrell, 2014). This means that educators must be capable of effectively understanding and using data to inform their decisions. These tasks require them to

know how to develop hypotheses, identify problems, collect and interpret data, and implement courses of action. Data literacy should not be confused with assessment literacy. Assessment data constitute only one type of data, whereas data literacy also requires knowledge about other types of data, such as data on perceptions, motivations, processes, and behaviors (Mandinach and Gummer, 2013).

Finally, to create a culture of inquiry, school boards and school leaders need to involve others as they interpret and engage with data; promote an internal sense of urgency regarding the use of data; make time for data interpretation and for establishing collective meaning; and make use of critical friends. This means that school boards and school leaders should communicate a clear vision on working with data in the school (Earl and Katz, 2006; Jimerson, 2014; Krüger, 2010). Furthermore, in a culture of inquiry, boards (school leaders) enhance the inquiry habit of mind and data literacy of school leaders (teachers) (Earl and Katz, 2006; Krüger and Geijsel, 2011; Wayman and Stringfield, 2006). For teachers, this third aspect means contributing to a culture of inquiry by collaborating with other teachers in conducting research in the school and using data to improve their own teaching. In his review study on data use and social networks in educational improvement, Daly (2012) found that interpreting and using data in schools are the purview of educators who engage in social interactions to co-construct, understand, and utilize data.

The interplay between school boards and school leaders regarding inquiry-based leadership

School boards are expected to monitor and enhance the educational quality of their schools (Hooge and Honingh, 2014; Lee et al., 2012). School board members in the Netherlands hardly spend any time working directly with teachers. Instead, they exert their influence via school leaders. Research on how school boards encourage school leaders' inquiry-based leadership, however, appears to be rare. Several studies have focused on how school boards promote the use of data. For example, Anderson et al. (2010) found that district leaders take four approaches to guiding principals and teachers in using data to make decisions aimed at improving schools. These strategies were: (1) setting expectations and monitoring data use; (2) modeling data use in district decision-making; (3) providing tools, recourses, and time; and (4) developing internal expertise to support data literacy. Wohlstetter, Datnow, and Park (2008) found that building expertise and capacity for data-driven decision-making is necessary but not a sufficient condition for cultivating a culture of data use. They suggested that school boards should also provide systemic support (e.g., aligned goals across the system, a structure encouraging the

bottom-up flow of information, structured collaborations within and across schools) and decision-making autonomy (Wohlstetter et al., 2008).

So far, the literature has paid little attention to the fact that when school boards and school leaders work together, not only do school boards influence school leaders, but also do school leaders influence school boards. School leaders might also have an effect on school boards' inquiry-based working. To investigate this mutual influence, this study examined the interplay between both types of educators.

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The interplay between school leaders and teachers regarding inquiry-based working

Previous research has revealed that teacher collaborations are a key factor affecting data use (Wohlstetter et al., 2008; Lachat and Smith, 2005; Wayman and Stringfield, 2006). According to Jimerson (2014), school leaders should support teachers in collaboratively synthesizing and organizing data in different ways. This requires school leaders to lead internal research processes and organize dialogues within their schools to make sense of data as a team (Krüger, 2010). Although supportive school leaders apparently play an important role in enabling teachers to effectively use data (Schildkamp and Kuiper, 2010), according to Daly (2012), many studies have suggested that leaders may not have the skill sets to provide the leadership necessary to support data use. This could be because leaders are primarily driven by their necessary data skills, rather than by the desire to create a culture of collaborative inquiry (Daly, 2012).

Research on the social relations between school leaders and teachers regarding inquiry-based working appears to be rare. To date, researchers have paid little attention to the fact that when school leaders and teachers work together, they influence each other's inquiry-based working via a parallel process. The direction of the effect potentially runs not only from school leaders to teachers, but also from teachers to school leaders. To investigate this mutual influence, this study focused on the interplay between both types of educators.

The present study

Based on a country-wide survey that we conducted in the Netherlands, we selected three primary schools to answer the following research question: "How can the interplay between school boards, school leaders, and teachers regarding inquiry-based working be characterized?" The study's two sub-questions were as follows:

1. How can the interplay between school boards and school leaders regarding inquiry-based leadership be characterized?

2. How can the interplay between school leaders and teachers regarding inquiry-based working and inquiry-based leadership be characterized?

Research context

In the Netherlands, children aged 4- to 12-years-old attend primary schools. Dutch primary schools have eight grade levels. One of the essential characteristics of Dutch education is that schools are relatively autonomous. Schools are free to choose the religious, ideological, and pedagogical principles on which they base their education, and they can also decide how to organize their teaching activities. The government funds both public and private schools. Consequently, schools shape their curriculums in a variety of manners. This freedom could also influence the extent to which schools work in an inquiry-based manner.

The Ministry of Education, Culture, and Science has set quality standards that apply to all schools. These cover the subjects students must study, attainment targets, the number of teaching hours per year, the qualifications required for teachers, and other similar topics. There is no national curriculum, however. Schools select the course content, the textbooks they use, and the programs or extra subjects on offer. There is no standard required curriculum. Primary teacher education in the Netherlands is traditionally a form of higher vocational education, and it is highly application-oriented.

School boards in the Netherlands are expected to monitor and enhance the educational quality of their schools. Many boards can exist in a single city. For example, Amsterdam has 43 separate boards, each comprising from 1-16 schools (Ladd and Fiske, 2011). School board members are sometimes voluntary participants (e.g., parents of students). Nowadays, however, most school boards in the Netherlands are composed of professional members. The Education Inspectorate is responsible for maintaining educational quality and holds schools accountable for their outputs. Thus, schools must conduct self-evaluations and can be tasked with improving their quality levels when necessary. For the Ministry of Education, Culture, and Science, inquiry-based working is one key aspect of school improvement. In 2007, the Ministry introduced a so-called "quality agenda," which encourages educators to make informed decisions in all aspects in education (Ministry of Education, Culture, and Science, 2007). Since that time, schools have been working towards becoming learning organizations where data guides educational improvement efforts. In an attempt to enhance the quality of primary

education, academic routes to the profession were introduced in 2008 (Van der Wal-Maris, Schellings, Geldens, and Beijaard, 2015). In line with that initiative, academic primary schools, at which research plays an important role and at which student teachers can learn their profession, also were established.

Methodology

Design and respondents

We used an embedded multiple-case study design (Yin, 2012) to investigate three primary schools in the Netherlands. Each school was evaluated as a whole (holistic level), and three groups were studied within each school: (1) school board members, (2) school leaders (i.e., principal, deputy director, middle manager, internal advisor), and (3) teachers of grades 5 through 8.

We based the case selection on a survey on inquiry-based working that we conducted prior to this qualitative study (see Uiterwijk-Luijk, Krüger, Zijlstra, & Volman, 2017; Uiterwijk-Luijk, Krüger, Zijlstra, & Volman, accepted). For the purpose of the present study, we screened the inquiry-based working scores of school leaders and teachers from 71 participating schools. As we were interested in good practices regarding inquiry-based working, we selected schools at which leaders and teachers gave themselves average to high scores on inquiry-based working. We then randomly selected three schools from the set. Each selected school was contacted by phone. If it did not want to participate in the case study, we approached another school from the list of average- to high-scoring school leaders and teachers. The case studies took place in Bridge Primary School, Queen Beatrix Primary School, and Mosaic Primary School. To maintain anonymity, all names used in this study are pseudonyms. All three schools had school boards composed of professionals (rather than volunteers).

Bridge Primary School is located in a medium-sized city. Its student population is diverse in terms of the socio-economic status of students' families, although its cultural diversity is limited. Most students are native Dutch. The school bases its educational offerings on the principles of the so-called Dalton Plan. Dalton education builds on the ideas of Helen Parkhurst (1886-1973), emphasizing three main principles: responsibility, freedom, and cooperation. Teachers seek to provide students with a structure encouraging them to take responsibility for their own learning process, act and think independently, and cooperate with

others (source: www.daltoninternational.org). Bridge Primary School's board also governs 14 other schools.

Queen Beatrix Primary School is an innovative primary school located in a relatively small city. Like Bridge, the families comprising its student population come from a variety of socio-economic backgrounds but are not very culturally diverse. Instead of employing a grade-based system, the teachers and students work in units. Each unit makes use of a large educational area with theme corners, quiet areas, and workplaces. Moreover, each unit contains a number of basic groups composed of mixed-grade students and a classroom teacher. Teachers design the curriculum around themes, and students explore different subjects within each theme. Students create a development portfolio, in which they write down their targets, results, and reflections on each theme or subject. Queen Beatrix's board also governs 11 other schools.

Mosaic Primary School is situated in a large city in a so-called "impulse area," a zone with low income levels and a high unemployment rate. Therefore, Mosaic receives additional funds to reduce students' educational disadvantages. The school has a diverse student population in terms of both cultural and socio-economic diversity. The school uses the regular year groupings from grade 1 through grade 8, and each class has its own teacher(s). Mosaic Primary is governed by a board that is also responsible for 31 other schools.

Data collection

In order to answer the research questions, this study employed the following data collection strategies: (1) interviews with school boards, school leaders, and teachers (see Table 5.1 for respondents); (2) observations of meetings with school boards, school leaders, and teachers (3 per school, total N=9; see Table 5.2); and (3) document analysis. This triangulation, augmented with complementary methods and data sources, improved the reliability of the findings and enhanced their validity (Miles, Huberman, and Saldaña, 2014).

Semi-structured interview schedules were developed, with the interview questions based on questionnaire items from the survey conducted prior to this study. We asked school boards and leaders to give examples of items on which they had scored highly. For school boards (school leaders), these items concerned stimulating school leaders' (teachers') inquiry habit of mind and data literacy and communicating a vision for inquiry-based working. Next, we asked school boards, school leaders, and teachers whether and how other educators stimulated them to work in an inquiry-based manner. Finally, we asked respondents if they had any valuable suggestions for other schools seeking to work in a more inquiry-based manner.

The initial question in all interviews was: "What do you think is the reason your school scored relatively highly on inquiry-based working in the survey?" The interviews took approximately 45-60 minutes.

Table 5.1. Respondents of the interviews per school.

	Chairman of the school board	School leaders	Teachers
Bridge	1	2	3
Queen Beatrix	1	2	4
Mosaic	1	6[a]	4

Note: [a] The six school leaders at Mosaic Primary School that were interviewed consisted of one principal, one deputy, one middle manager and three internal advisors.

Table 5.2. Observations per school.

	Meeting of school board and school leaders	Meeting of school leaders	Team meeting (team and school leaders)
Bridge	1[a]	N/A	2
Rainbow	1[b]	1	1
Queen Beatrix	N/A[c]	N/A	3[d]

Notes: [a] Meeting of the school board with school leaders from fourteen schools. [b] Meeting of the school board with three school leaders from Rainbow. [c] N/A = Not Available. [d] The three team meetings at Queen Beatrix consisted of one regular team meeting, one "end of the week evaluation" and one study day.

We observed and videotaped several meetings (see Table 5.2) and made field notes to document events outside of the camera's range. Participants were observed with reference to them stimulating each other to work in an inquiry-based manner. Meeting observations lasted from 15-90 minutes. One observation took a whole day, following teachers and school leaders during a study day. Two interviews interrupted that observation. In addition, we analyzed documents to gain a complete picture of how each school's board, leaders, and teachers encouraged each other's inquiry-based working. In the Netherlands, all schools are obligated to have both an annual plan and a four-year policy plan. We studied both of these documents. In addition, we analyzed inspection reports and meeting agendas and minutes from the past two years. We randomly selected a maximum of 20 documents per type.

Data analysis

We transcribed and coded all interview data according to a coding scheme using MAXQDA coding software. To analyze the data, we first used deductive coding, with the coding scheme based on the theoretical framework. For example, we utilized a code such as: "school leader stimulates teachers' inquiry habit of mind by discussing student results with teachers." However, we permitted other codes to emerge from the data (inductive coding), such as "school leader stimulates teachers' inquiry habit of mind by having high expectations." To create the coding scheme, two researchers independently created codes and categories based on a random set of nine interview transcripts (two school board transcripts, three school leader transcripts, and four teacher transcripts). Disagreements were settled through discussion, and the meanings of the codes were carefully adjusted. Once the codes and categories had been clearly defined, both researchers then used them to label the remaining transcripts. Random sampling was used to check for similarities and differences in the remaining transcripts, and discussions settled any inconsistencies.

The coding scheme that emerged from the interviews guided the analysis of the data from the observations and documents. Specifically, we evaluated whether the observations and documents reinforced or contradicted these trends. We used the coding scheme to find examples of boards, leaders, and teachers encouraging each other to work in an inquiry-based manner. Relevant fragments were selected and interwoven into the description of the findings. Based on Miles et al. (2014), a cross-case analysis was used to develop sophisticated descriptions and deepen our understanding of the inquiry-based working of school boards, school leaders, and teachers. Next, a within-case analysis provided a well-grounded view of the good practices of each separate school as a whole.

Results

This section offers an overview of the school boards, school leaders, and teachers' different approaches to inquiry-based working. Next, we compare the three schools and look for differences and similarities. We end this section with a portrait of each separate school as a whole.

Overview of different approaches

Following coding, four categories emerged describing how school boards stimulated school leaders' inquiry-based working: (1) stimulating school leaders' inquiry habit of mind, (2) stimulating school leaders' data literacy, (3) communicating a vision for inquiry-based working, and (4) supporting inquiry-based working. As Table 5.3 makes clear, the four categories were subdivided into 13 codes. Four codes were directly related to the interview questions (e.g., "The school board stimulates school leaders' inquiry habit of mind by encouraging leaders to discuss student results with teachers"), and the other nine codes emerged from the respondents' answers.

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Table 5.3. School boards' approaches to stimulating school leaders' inquiry-based leadership

Methods	Bridge	Beatrix	Mosaic
Stimulate school leaders' inquiry habit of mind by:			
1. Discussing student results with school leaders	X	X	X
2. *Encouraging leaders to discuss student results with*	X		X
teachers	X	X	X
3. Sharing knowledge	X	X	X
4. Modeling behavior		X	X
5. Making demands	X	X	X
6. Having high expectations			
7. Encouraging leaders to cooperate and discuss research	X	X	X
results with school leaders from other schools			
Stimulate school leaders' data literacy by:			
8. *Involving external organizations to support school*			
leaders in conducting research		X	X
9. *Developing internal expertise to support inquiry*	X		
Communicate the vision for inquiry-based working by			
10. *Communicating orally about the vision for inquiry-*			
based working		X	
Support inquiry-based working by:			
11. Providing money, time, and space	X	X	X
12. Trusting and believing	X	X	
13. Being open to new ideas concerning research	X	X	

Note: The text in italics represents codes that were directly related to the survey items.

Table 5.4 demonstrates the three categories that emerged regarding how school leaders stimulated school boards' inquiry-based working, namely: (1) trusting and believing, (2) being critical, and (3) raising awareness of issues in need of investigation.

Table 5.4. School leaders' approaches to stimulating school boards' inquiry-based leadership

Methods	Bridge	Beatrix	Mosaic
1. Trusting and believing		X	
2. Being critical	X	X	
3. Raising awareness of issues in need of investigation		X	

Examining the interplay between school leaders and teachers, we found that the same four categories describing how boards stimulated leaders' inquiry-based working also indicated how school leaders stimulated teachers' inquiry-based working. In addition, we found a fifth category, namely, school leaders sharing leadership with teachers. We subdivided these 5 categories into 15 codes (see Table 5.5). It made logical sense that the codes again had a direct link to the interview questions. As Table 5.5 illustrates, 4 codes were directly related to the interview questions, while the other 11 codes emerged from the respondents' answers. As Table 5.6 depicts, two categories indicated how teachers stimulated school leaders' inquiry-based working: (1) being critical and (2) modeling behavior. In this study, the term "modeling behavior" referred to (un)conscious behavior encouraging others to work in an inquiry-based manner.

Comparison of the three schools: differences and similarities

Although the inquiry-based approaches of each school's board, leaders, and teachers exhibited similarities, their reasons for doing so differed. At Bridge Primary, inquiry-based working served as a means of innovating (e.g., discovering new teaching strategies) to meet the demands of today's changing society. At Queen Beatrix Primary, a focus on conducting research at all levels in the school (from the board to students), so as to strengthen students' inquiry habit of mind, drove behavior. Mosaic Primary emphasized the analysis of assessment data and inquiry-based working as a means of improving students' test results.

Table 5.5. School leaders' approaches to stimulating teachers' inquiry-based working

Methods	Bridge	Beatrix	Mosaic
Stimulate teachers' inquiry habit of mind by:			
1. *Discussing student results with teachers*	X	X	X
2. *Encouraging teachers to discuss data with each other*	X	X	X
3. Sharing knowledge	X	X	X
4. Modeling behavior	X	X	X
5. Making demands	X	X	X
6. Having high expectations	X	X	X
Stimulate teachers' data literacy by:			
7. *Involving external organizations to support teachers in conducting research*		X	X
8. Training teachers in research skills (by school leaders)		X	
9. Handing out step-by-step instructions regarding research skills	X	X	
10. Shaping the school into an "academic primary school"		X	
Communicate a vision for inquiry-based working by:			
11. *Communicating orally about the vision for inquiry-based working*		X	
Share leadership by:			
12. Sharing leadership responsibilities with teachers	X	X	X
Support inquiry-based working by:			
13. Providing money, time, and space	X	X	X
14. Being open to new ideas concerning research	X	X	X
15. Creating a safe environment	X	X	X

Note: The text in italics represents codes that were directly related to the survey items.

Table 5.6. Teachers' approaches to stimulating school leaders' inquiry-based leadership

Methods	Bridge	Beatrix	Mosaic
1. Being critical		X	X
2. Modeling behavior		X	X

The interplay between the school board and school leaders

To create an inquiry-based culture, the school boards of all three schools stimulated school leaders' inquiry habit of mind and data literacy and supported inquiry-based working in a variety of ways. To stimulate school leaders' inquiry habit of mind, they discussed, for example, data on student results with school leaders. At Bridge and Mosaic, the school board specifically encouraged school leaders to also discuss data with teachers. All three school boards shared knowledge with their school leaders but did not explicitly encourage school leaders to share knowledge with teachers. However, school leaders still appeared to do this. In addition, all three school boards stimulated their school leaders' inquiry habit of mind by modeling behavior, setting high expectations, and encouraging them to cooperate and share results with leaders from other schools. At Beatrix (where the focus was on students' inquiry habit of mind) and Mosaic (where the focus was on students' test results), boards also made demands regarding inquiry-based working. The three boards stimulated school leaders' data literacy by either involving external organizations (Beatrix and Mosaic) or developing internal expertise (Bridge).

In all three organizations, inquiry-based working constituted an important aspect of their culture. However, none had a written vision for it. At Queen Beatrix, the school board did communicate orally on the topic. At all three schools, the school board provided money, time, and space for working in an inquiry-based manner. For example, boards organized in-company education. At Bridge and Beatrix, trusting school leaders and believing in them were important aspects of the school board's approach. At Beatrix, these aspects were also mentioned in the opposite regard, with participants indicating that school leaders trusted their school board and had faith in it. The final way that school boards supported inquiry-based working was by being open to new ideas concerning research (Bridge and Beatrix). At both schools where this factor played a role, school leaders enjoyed an atmosphere in which they could critically question their school board. In addition, leaders at Queen Beatrix brought the board's attention to issues in need of investigation.

The interplay between school leaders and teachers

School leaders at all three schools took the same approach to stimulating teachers' inquiry habit of mind in order to create an inquiry-based culture (see Table 5.5): (a) discussing student results

with teachers, (b) encouraging teachers to discuss data with each other, (c) sharing knowledge, (d) modeling behavior, (e) making demands, and (f) having high expectations.

At Beatrix and Mosaic, leaders brought in external organizations to stimulate teachers' data literacy. At Beatrix and Bridge, leaders handed out step-by-step instructions on how to conduct research. In addition, at Beatrix, school leaders stimulated teachers' data literacy by training teachers in research skills and shaping the school into an academic primary school.

As mentioned above, none of the schools had a written vision for inquiry-based working. At Queen Beatrix, the school leaders communicated orally about it, however. At Mosaic, the principal pointed out that there was "*somewhere a rule that all decisions must be based on data,*" but that focus was more implicit than explicit and was not recognized in the interviews with teachers. School leaders from all three schools shared leadership responsibilities and supported inquiry-based working in several ways:

(a) by providing money, time, and space:

> *I think our school leaders give us a lot of autonomy to explore, to find out for ourselves what works and what does not work. Not steering, but rather giving us the space to do so.* (Teacher at Queen Beatrix Primary School)

(b) by being open to new ideas concerning research:

> *If you have a problem, you can always discuss it, and it will be investigated to find out what the cause is. For example, the reading comprehension of students appeared to be weak. After investigating our teaching methods, we added a new teaching method that filled in the gaps we had found. And, it is a great success.* (Teacher at Mosaic Primary School)

(c) by creating a safe environment:

> *You see people who sort things out, who want to share experiences and results with each other. They want to talk about and discuss it together, without any kind of reproach or negative atmosphere; it is all very constructive.* (Principal at Queen Beatrix Primary School)

At Beatrix and Mosaic, teachers demonstrated the inquiry-based culture by being critical (e.g., asking critical questions about the bases for decisions) and modeling behavior (e.g., investigating and improving their own actions by comparing them with those of others and discussing the results). These actions prompted school leaders to work in an inquiry-based manner. This was not seen at Bridge.

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Bridge Primary School

The school board at Bridge Primary School consisted of one professional administrator, Chairman Jan. The school's leadership team was composed of one principal (Tanja), two middle managers, and one internal advisor. The school also employed 20 teachers. As mentioned above, at Bridge, working in an inquiry-based manner meant innovating, so as to meet the demands of today's changing society.

The interplay between the school board and school leaders at Bridge Primary School

At Bridge, the interplay between Chairman Jan and school leaders regarding inquiry-based working was characterized by Jan standing back and appreciating the school leaders' inquiry-based approaches. This approach is in line with Wohlstetter et al.'s (2008) suggestion that school boards should give school leaders decision-making autonomy.

> *I can see that the principal supports teachers who do not show any progress, to ensure that they grow. She expects that of them. She expects them to work with an inquiry habit of mind. It is her intention to embed inquiry-based working in the school organization.*
> (Jan, chairman of the school board at Bridge Primary School)

In return, Principal Tanja appreciated Jan's inquiry habit of mind. She mentioned that he was well aware of educational research findings and that he regularly sent her interesting research papers. Indeed, during the observed meeting between Jan and the school leaders, Jan regularly referred to external research and national trends in education. Once a year, the school leaders met with Chairman Jan to discuss school results. At that meeting, he emphasized the importance of formulating hypotheses, analyzing data, thinking of different solutions, and avoiding hasty conclusions. Tanja was satisfied that her school could operate autonomously but believed that knowledge exchanges between schools should happen more often. In her view, Jan could play a more active role in realizing that. The chairman stimulated data literacy by appointing an internal expert to develop an instrument that school leaders could use to gather and analyze data on teachers' capabilities. The internal expert trained school leaders from all of the schools in Jan's district on how to use the instrument. The school's multiyear plan indicated that the goal of this instrument was obtaining a better picture of teacher capacities to enhance educational quality. As Table 5.4 demonstrates, from their end, school leaders encouraged the board chairman to work in an inquiry-based manner by asking critical questions about new ideas that he had introduced to the school.

> *I think that a lot of ideas are brought into our school as if they were the answer to everything, even if there was not even a question to start with. We should start with problems and questions from inside our school, not with a theory or study someone has read somewhere.* (Tanja, principal at Bridge Primary School)

The interplay between school leaders and teachers at Bridge Primary School

Trust was the key element characterizing the interplay between school leaders and teachers at Bridge. The school leaders had high expectations for teachers, but they also believed that teachers would raise, investigate, discuss, and solve any issues in the school. In that inquiry-based culture, school leaders communicated a clear vision for education (the Dalton concept). Tanja pointed out that the Dalton concept's vision anchored the team's inquiry-based working. Indeed, all respondents pointed out that the team was open to innovation and research. Innovativeness, combined with a clear educational vision and inquiry-based working, ensured that leaders and teachers continuously evaluated all on-going work and new plans. Or, as both one of the teachers and the principal pointed out:

> *The success factor for inquiry-based working at this school is that new opportunities can be tried out and discussed collectively. When something can be done in a better way, actions will be undertaken. Or, at least the possibilities for our school will be looked at.* (Tanja, principal at Bridge Primary School)
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> *Our clear vision of what we want in our education is evident in our high expectations. This gives us something to evaluate and to reflect upon.* (teacher at Bridge Primary School)

The school leader supported working in a culture of inquiry by arranging for teachers to collaborate in so-called workgroups. In these groups, teachers investigated and evaluated new ideas in an environment allowing them to critically reflect on their own teaching. The principal established clear research directions for the teachers to give them guidance and structure.

> *It is a good thing that we follow specific steps to give guidance (...) For example, during our research on making it easier for children to pass from grade 2 to grade 3, we formulated the hypotheses together. The next step was that all of these hypotheses needed to be investigated.* (Tanja, principal at Bridge Primary School)

During the interviews, teachers indicated that they appreciated the culture that the school leaders had created in the school, which they described as providing them with autonomy to investigate anything of importance to them: "*If you want to conduct research yourself, you are*

guaranteed to get the cooperation and space you need" (teacher at Bridge Primary School). They mentioned the high expectations and the drive to innovate to improve educational quality. Teachers' influence on school leaders was not emphasized.

Queen Beatrix Primary School

The school board at Queen Beatrix Primary School consisted of one professional administrator: Chairman Peter. The school's leadership team was comprised of one principal (Karen), two middle managers, and one internal advisor. The school counted 9 teachers. As mentioned, Beatrix focused on conducting research at all levels in the school, from the board to students, so as to strengthen students' inquiry habit of mind.

The interplay between the school board and school leaders at Queen Beatrix Primary School

The interplay between the board and school leaders was characterized by a focus on conducting research. Chairman Peter stressed the importance of investigating and using data when, for example, writing improvement plans: *"I say to them, 'Data should be made a priority–analyze it, discuss it with each other, make sure you draw your improvement plans from it.'"* From their end, school leaders prompted Chairman Peter to work in an inquiry-based manner by trusting and believing in him, as well as by asking critical questions and bringing his attention to issues requiring examination. For example, Peter mentioned that, *"Karen, the principal, often asks me, 'Well, you asked this of us, but why? What is it based on?'"* Both the governor and the school leaders emphasized that trusting and believing in one another was an important aspect of their inquiry-based culture.

> *Just being able to talk to each other on an equal basis. It's like, I face something difficult, how can we best deal with that?* (Karen, principal at Queen Beatrix Primary School)

The interplay between school leaders and teachers at Queen Beatrix Primary School

Shared leadership, shared responsibilities, and shared knowledge are the key words characterizing the interplay between school leaders and teachers at Queen Beatrix. For example, the internal advisor shared knowledge that made teachers rethink their own teaching.

> *What I like is that our internal advisor has been to several workshops that made her really enthusiastic about a specific type of instruction. She shares this knowledge with us, which stimulates us to reevaluate our own instruction.* (teacher at Queen Beatrix Primary School)

During the observed study day, teachers brought their own data. One of the school leaders led a group session for teachers reviewing the research cycle, and instructions detailing how to analyze data were handed out. Next, the teachers analyzed their data in small groups and discussed the results. Afterwards, they presented their results in two subgroups. The interviews and meeting agendas made clear that the leaders and teachers took turns providing instruction and taking the lead during study days or meetings.

Although none of the documents described the school's vision for inquiry-based working, in the interviews, school leaders and teachers indicated that this concept was communicated orally.

> *We really want to acknowledge conducting research in everything we do. We always talk about 'What have you achieved? How did you get these results? And, how do you analyze what still needs to be done?' We think it is self-evident that we should always look for information and study data in depth.* (Karen, principal at Queen Beatrix Primary School)
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> *The vision of the school leaves quite a lot of room. I think that is a strong point. You are always welcome to contribute new ideas. It is not fixed.* (teacher at Queen Beatrix Primary School)

As Table 5.6 demonstrates, teachers in turn stimulated school leaders' inquiry-based leadership by asking critical questions and modeling behavior. For example, one of the school leaders said in an interview that, "*I am very encouraged by teachers, not so much because of the things they say, but because I see how it motivates them to work in this inquiry-based manner.*"

Mosaic Primary School

The school board at Mosaic Primary School consisted of two professional administrators: Chairman Michael and Patrick, a member. The leadership team at the school consisted of one principal (Tom), one deputy, three middle managers, and three internal advisors. The school employed 27 teachers. Mosaic focused on assessment data, and inquiry-based working served as a way of improving student results.

The interplay between the school board and school leaders at Mosaic Primary School

The interplay between the school board and the school leaders at Mosaic was characterized by a focus on student assessment data.

> *We use an instrument to analyze all our schools. If it is a good school, all scores are green, which means they are above the national average. When a score is red, we try to find out the reason. Are there, for example, difficulties with the applied teaching method? We will put down a range of recommendations for the school. Depending on the seriousness of the signal, we discuss the progress every few weeks, or just two times a year.* (Michael, chairman at the school board at Mosaic Primary School)

During the observed meeting between the school leaders and Michael, they discussed whether established attainment goals for student test results had been reached. The multiyear plan illustrated the school's high goals. To achieve these objectives, the board made demands and set high expectations. Michael indicated that they modeled behavior by conducting research themselves and that they shared knowledge by distributing articles or pointing out where to find information on the Internet. The deputy recognized this:

> *Patrick showed me a website which I found quite interesting. It shows the results of all primary schools in the Netherlands. He showed me a school that is similar to our school. That school's scores were much higher than ours. That made me think, 'How is that possible?'* (deputy at Mosaic Primary School)

Mosaic was the only school in which we did not find evidence of school leaders encouraging the school board to work in an inquiry-based manner.

The interplay between school leaders and teachers at Mosaic Primary School

Openness characterized the interplay between school leaders and teachers regarding inquiry-based working at Mosaic. They demonstrated significant respect for one another, were willing to learn from one another, and left classroom doors open. School leader Tom stated in an interview that he modeled inquiry-based working by working with internal advisors to analyze the neighborhoods in students' postcodes. They then compared their findings with government data about the different zones in his city. He made this effort, because parents in the Netherlands are free to choose their children's school. By analyzing this data, they gathered information on the type of families attracted to their school and on the types of families that left the school early. Together with other leaders, they discussed whether the findings demonstrated a need to

adjust their policies, their classroom activities, or even their vision for the type of school they wanted to be.

Just as the school board did with the school leaders, the school leaders discussed student results with teachers twice a year. School leaders prompted teachers to observe each other in the classroom and discuss the strengths and weaknesses of each other's teaching techniques. All teachers were asked to observe at least two colleagues each year and to be observed by a colleague at least once per year.

> *Beforehand, I had set myself a goal, and we all had to develop a personal action plan. Then I asked my colleague if I could observe her spelling instruction. I wanted to know how she did that so I might be able to improve my own spelling instruction.* (teacher at Mosaic Primary School)

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Until recently, the school leaders presented the entire school's student achievements to teachers, so that they could discuss the results. However, as Tom stated "*teachers were always quite anxious about that, because I would always ask them, 'Can you explain these results?'*" This school year, so as to share the responsibility of discussing student achievements, Tom asked the grade 5 teachers to present their results to the rest of the team. The teachers mentioned that they felt secure enough to show their weaknesses and that no one faced negative repercussions if, for example, results had not improved. Everyone felt welcome to speak up or ask questions. Several teachers mentioned that this safe environment was an essential element of the school in general and of inquiry-based working in particular.

In turn, as Table 5.6 depicts, teachers stimulated school leaders' inquiry-based working by being critical and modeling behavior.

> *A few teachers had been reading and discussing the listening comprehension of young children. They found out that it is important to pay more attention to this in grades 1 and 2. That did not come from the school leaders but from the teachers themselves.* (internal advisor at Mosaic Primary School)

> *When I run into something concerning student achievements, I automatically go to our deputy. She is our contact person about that. For example, with math I found the standards too strict. So, I asked her to examine these standards again. And, last week I heard one of the other teachers ask her about her reasons for the way she grouped some students.* (teacher at Mosaic Primary School)

The evidence for these two aspects (teachers being critical and modeling behavior) was limited. They were mentioned during the interviews but were not evident during the observations or in the analyzed documents.

Conclusion and discussion

The findings of the present study contribute to our understanding of the interplay between school boards, school leaders, and teachers regarding inquiry-based working. We studied three primary schools, each with unique reasons for working in an inquiry-based manner. These included innovating and connecting to the demands of today's changing society, enhancing students' inquiry habit of mind, and improving students' test results. In addition, the three schools were situated in quite dissimilar areas and served different populations. Two schools were located in smaller cities in areas with average incomes and an average unemployment rate, while one school was situated in a large city in an area with low incomes and a high unemployment rate. These dissimilarities make this study's outcomes useful for different types of schools, located in a range of areas and with a variety of goals.

Our first question was: How can the interplay between school boards and school leaders regarding inquiry-based leadership be characterized? In total, we found 13 ways in which school boards stimulated school leaders' inquiry-based leadership. These were as follows: (1) discussing student results together with school leaders; (2) encouraging school leaders to discuss student results with teachers; (3) sharing knowledge; (4) modeling behavior; (5) making demands regarding inquiry-based working; (6) having high expectations; (7) encouraging leaders to discuss research results with school leaders from other schools; (8) involving external organizations, so as to help school leaders conduct research in a more professional manner; (9) developing internal expertise to support inquiry; (10) communicating about the vision for inquiry-based working; (11) providing money, time, and space; (12) trusting and believing; and (13) being open to new ideas concerning research. Anderson et al. (2010) also found evidence of some of these approaches, namely: modeling behavior; having high expectations; developing internal expertise to support inquiry; and providing money, time, and space.

Wohlstetter et al. (2008) suggested that school boards should provide systemic support and decision-making autonomy. This study saw evidence of this in two of the schools, but because this aspect was not specifically linked to inquiry-based working, it was not coded as such. We were impressed with the school leaders' powerful role in encouraging school board members' inquiry-based leadership by trusting and believing in them, prompting critical questions, and raising awareness regarding issues in need of investigation.

Our second question was: How can the interplay between school leaders and teachers regarding inquiry-based working and inquiry-based leadership be characterized? We found 15 ways in which school leaders stimulated teachers' inquiry-based working. The first six

approaches involve school leaders stimulating teachers' inquiry habit of mind by: (1) discussing student results with them; (2) encouraging teachers to discuss data with each other; (3) sharing knowledge; (4) modeling behavior; (5) making demands; and (6) having high expectations. In line with Jimerson (2014), who pointed out that school leaders should support teachers' effective use of data, we found four ways in which school leaders accomplished that task: (7) involving external organizations, so as to support teachers in conducting research; (8) training teachers in research skills; (9) handing out step-by-step instructions regarding research skills; and (10) shaping the school into an "academic primary school." Finally, we found the following 5 ways in which school leaders stimulated teachers' inquiry-based working: (11) communicating the vision for inquiry-based working; (12) sharing leadership with teachers; (13) providing money, time, and space; (14) being open to new ideas concerning research; and (15) creating a safe environment. When examining teachers' effect on school leaders' inquiry-based leadership, we found evidence of 2 approaches. Teachers asked critical questions and modeled behavior.

In short, the potential for inquiry-based working in schools often depends on top-down initiatives: from the board to leaders, and from leaders to teachers. Nevertheless, this study found powerful approaches that also helped teachers to influence leaders and leaders to influence the board. This means that we no longer can dismiss the influence of the interplay between educators with different roles in schools.

Limitations of the study and implications for educational practice and policy

To enrich our understanding of inquiry-based working, our initial intent was to study schools in which all educators were extremely effective at working in an inquiry-based manner. Unfortunately, we were not able to find schools that had scored so highly and also wanted to participate in this study. However, this study still provides clear insight into how school board, school leaders, and teachers can encourage each other's inquiry-based working.

If we want to encourage educators to work in a more inquiry-based manner, there is the challenge of prompting boards and leaders to clearly formulate their vision for inquiry-based working. Several studies (e.g., Earl and Katz, 2006; Jimerson, 2014; Krüger, 2010) have established the importance of having a clear vision for inquiry-based working. The three studied schools all had their own views on why working in an inquiry-based manner is important. However, none of them had recorded this vision in writing. Writing down such a vision can help schools explicating their reasons for adopting that approach, and making them more aware

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of their actions (Geijsel, Sleegers, Stoel, & Krüger, 2009). In addition, we saw that boards (leaders) did not explicit the data they based their decisions on. This means a challenge exists for boards (leaders) to involve leaders (teachers) in their data-based decision making. This is the case not only when it comes to student assessment data but also when it comes to other decisions regarding, for example, policy development and planning.

Our study has made clear there are several ways to shape accountability and data-based decision-making in schools. National policy-makers and the inspectorate can use these results as an example to emphasize not only the use of assessment data in schools but also the broader phenomenon of inquiry-based working, including a culture of inquiry in schools. Educators of leaders and teachers could focus on the top-down and bottom-up interventions that each of them can undertake to stimulate this type of working in school organizations. Teacher (school leader) educators can concretize teachers' (leaders') potential influence on school leaders (school boards) regarding inquiry-based working. This paper gives many examples of approaches that school boards, school leaders, and teachers can use to stimulate inquiry-based working at all levels in schools.