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### Inquiry-based leading and learning

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

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## CHAPTER 6

### Summary and general discussion

#### Inquiry-based leading and learning

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

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#### Introduction

Inquiry-based working is assumed to contribute to improving educational quality (Krüger 2010a) and to stimulate professional learning (Katz & Dack, 2014). It involves having an inquiry habit of mind, being data literate and creating a culture of inquiry in schools (based on Earl & Katz, 2006). The general aim of this study was to provide insight in the way school boards, school leaders and teachers work in an inquiry-based manner, how an inquiry-based culture is established in schools and what this means for the inquiry habit of mind of students. A students' inquiry habit of mind includes being curious and having critical thinking skills.

To find out what encourages educators to work in an inquiry-based manner, we used a quantitative survey to investigate the relationship between the psychological factors *attitude*, *experienced social pressure*, *self-efficacy* and *collective efficacy*, and school leaders' and teachers' inquiry-based working (described in chapter 2 and 3). In addition, we performed a case study at 3 schools to investigate the mutual influence between school boards, school leaders, and teachers regarding inquiry-based working (chapter 5). To examine the relationship between teachers' inquiry-based work and students' inquiry habit of mind we combined the results from our survey and our case study (chapter 4). In this final chapter, the main findings and conclusions are presented and discussed.

### Summary of the main findings and conclusions

In **chapter 2**, a study on inquiry-based leadership was presented. The central question was formulated as follows: *How are attitude, experienced social pressure and self-efficacy related to inquiry-based leadership in primary schools?* To answer this question 79 school leaders completed a questionnaire about their attitude towards inquiry-based leadership, the experienced social pressure they feel to lead their school this way and their self-efficacy regarding inquiry-based leadership. In addition, the questionnaire asked about three aspects of inquiry-based leadership: working with an inquiry habit of mind, being data literate and creating a culture of inquiry in the school.

The predictor that stood out to the greatest degree was *self-efficacy regarding inquiry-based leadership*. Self-efficacy regarding inquiry-based leadership appeared to be related to all three aspects of inquiry-based leadership. The sole sub-aspect for which self-efficacy regarding inquiry-based leadership did not show a specific contribution was stimulating the inquiry habit of mind of teachers. *Attitude towards inquiry-based leadership* appeared to be related to two sub-aspects of creating a culture of inquiry: communicating a vision on inquiry-based working and stimulating the inquiry habit of mind of teachers. There was no relationship found between *experienced social pressure* and inquiry-based leadership. However, a strong positive correlation among the three predictors and between a) each psychological factor (self-efficacy, attitude and experienced social pressure) and b) all aspects of inquiry-based leadership was found. This means that although some predictors do not make a unique contribution to inquiry-based leadership, self-efficacy, attitude and experienced social pressure with regard to inquiry-based leadership are all strongly related to inquiry-based leadership.

This study also investigated the role of several background characteristics. Taking into account the psychological factors, only *age* appeared to be related to two aspects of inquiry-based leadership: school leaders in the age group 51–60 score higher than others on stimulating teachers' inquiry habit of mind and on stimulating teachers' data literacy. This means that participants in the age group 51–60 lead their schools in a more inquiry-based manner than younger leaders, perhaps due to experience.

**Chapter 3** reports on the relationship between psychological factors and inquiry-based working by teachers. The central question of this study was: *How are attitude, experienced social pressure, self-efficacy regarding inquiry-based working, and collective efficacy regarding inquiry-based working related to inquiry-based working by primary school teachers*

*in the Netherlands?* To answer this question data from questionnaires completed by 249 teachers were used.

Again, as in chapter 2, the predictor that stood out to the greatest degree was *self-efficacy regarding inquiry-based working*. Self-efficacy regarding inquiry-based working is a factor that appeared to be related to all aspects of teachers' inquiry-based working. Teachers with a strong sense of self-efficacy towards inquiry-based working also had a strong inquiry habit of mind, possessed high skills related to data literacy, strongly contributed to a culture of inquiry at the school level and strongly created a culture of inquiry in their classrooms. It seems that in order to work in an inquiry-based manner it is necessary for teachers to believe that they are able to successfully perform behaviour related to the different aspects of inquiry-based working. *Collective efficacy regarding inquiry-based working* appeared to be related to three sub-aspects of working in a culture of inquiry: at the school level through collaboration with colleagues and at the classroom level through stimulating students' inquiry habit of mind and students' data literacy. Apparently, teachers' beliefs about the ability of his or her team to work in an inquiry-based manner are relevant for contributing to a culture of inquiry on the school level and for creating a culture of inquiry in the classroom. As opposed to self-efficacy regarding inquiry-based working, there was no relationship between collective efficacy regarding inquiry-based working and working with an inquiry habit of mind or being data literate.

In addition, this study showed that primary school teachers with a strong positive *attitude towards inquiry-based working* also scored high on working with an inquiry habit of mind. However, no direct relationship between attitude and other aspects of inquiry-based working was found. This study also showed that teachers who strongly felt that others expected them to work in an inquiry-based manner (*experienced social pressure*) also had a stronger inquiry habit of mind. However, experienced social pressure was not found to have a relationship with other aspects of teachers' inquiry-based working.

We explored how a number of background characteristics were related to inquiry-based working by primary school teachers in the Netherlands. What stood out is that teachers in grade 5 seemed to stimulate students' data literacy more than teachers who teach in other grades. Perhaps the teaching methods used by teachers differ per grade on this matter, or teachers working in grades 6, 7 and 8 might think students already possess research skills.

In the following study, described in **chapter 4**, a mixed-method study was used to answer the question: *What is the relationship between teachers' inquiry-based working and*

*students' inquiry habit of mind?* A students' inquiry habit of mind includes being curious and having critical thinking habits. For this part of the study, we used the same responses from the 249 teachers as described in chapter 3 and the responses from 1,104 students from grade 5 through grade 8. At the school level the survey data revealed a relationship between teachers' inquiry-based work and students' curiosity. The more teachers worked with an inquiry habit of mind and the more teachers stimulated students' data literacy, the more curious the students in that school appeared. Teachers' collaborative inquiry with colleagues, teachers' data literacy, and efforts to stimulate students' inquiry habit of mind did not seem to influence student curiosity. Three of teachers' psychological factors regarding inquiry-based working appeared to be important for students' curiosity: (1) teachers' positive attitude towards inquiry-based working, (2) a strong sense of self-efficacy regarding inquiry-based working, and (3) collective efficacy regarding inquiry-based working.

However, no relationship was found between any aspect of the teachers' inquiry-based approach and students' critical thinking habits. The case study results on the other hand, illustrated several approaches of teachers to work in an inquiry-based manner that could stimulate not only students' curiosity, but also students' critical thinking habits.

**Chapter 5** presented the key findings from a qualitative case study in three primary schools, focused on the interplay between school boards, school leaders, and teachers regarding inquiry-based working. Each of the three schools had their own 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 reasons to work in an inquiry-based manner. In total we found thirteen ways in which school boards stimulate school leaders' inquiry-based leadership. For example, we found approaches like: discussing student results together, stimulating to cooperate and discuss research results with school leaders from other schools, trusting and believing, and being open to new ideas concerning research. The other way around school leaders stimulated school board members' inquiry-based leadership by also trusting and believing in them, by prompting critical questions, and by raising awareness about issues that need to be investigated.

We also found fifteen ways in which school leaders stimulate teachers' inquiry-based working, including approaches like: modeling behavior, involving external organizations to support teachers in conducting research, sharing leadership with teachers, and creating a safe environment. Teachers stimulated their school leaders' inquiry-based leadership by asking critical questions and by modeling behavior.

We can conclude that the potential for inquiry-based working in schools is highly stimulated by top-down initiatives: from board to leaders and from leaders to teachers. Nevertheless, this study found powerful approaches that helped teachers to influence leaders and leaders to influence board members to work in an inquiry-based manner.

## **General discussion**

### *Contributions of this dissertation*

This dissertation contributes to the existing research on data-based working in schools. Firstly by focusing on inquiry-based working instead of data use. Many international studies emphasize the importance of data use in schools (e.g. Anderson et al., 2010; Ikemoto & Marsh, 2007; Jimerson, 2014; Katz & Dack, 2014; Mandinach, 2012; Schildkamp et al., 2012; Schildkamp et al., 2014). However, inquiry-based working differs from the more standard 'data use' in the sense that it does not focus on the use of data but, instead, encourages an approach within schools where inquiry together with the use of data is at the centre. This requires professionals in the school to work with an inquiry habit of mind, to be data literate, and to create a culture of inquiry (Earl & Katz, 2006; Krüger & Geijsel, 2011). Secondly, this dissertation contributes to the existing research on data-based working in schools, by focussing on psychological factors instead of knowledge and skills that are related to this type of work. While the knowledge and skills of school leaders and teachers using data have been studied, little is known about the psychological factors that may influence the extent to which inquiry-based working is carried out (e.g. Vanhoof et al., 2014). Moreover, there is a third gap in the existing research which is narrowed by this dissertation. No research so far has evaluated the potential influence of teachers on the inquiry-based working of school leaders, or the potential influence of school leaders on the inquiry-based working of school boards. The results of this study increases our understanding of the interplay between school boards, school leaders, and teachers regarding inquiry-based working. Indeed, we found that the potential for inquiry-based

working in schools is highly stimulated top-down: from board to leaders and from leaders to teachers. However, we also found several approaches in the influence the other way around: from teachers to leaders and from leaders to boards. This means we no longer can dismiss the influence of the interplay between educators with different roles in schools.

Our findings described in Chapter 2 and 3 offer new insights in how psychological factors are related to whether and how school leaders and teachers work in an inquiry-based manner. In our study self-efficacy regarding inquiry-based working appeared to be important for both school leaders' as well as teachers' inquiry-based working. This is in line with earlier research (Krüger & Geijsel, 2011). In addition, our study shows that for teachers also collective efficacy is important. Apparently a high sense of self-efficacy towards inquiry-based working is needed for school leaders and teachers to work in an inquiry-based manner. For teachers also a high sense of collective efficacy is needed. Research of Vanhoof et al. (2014) showed that for school leaders in Flanders a positive attitude towards data use is important. The results of our study show that although related through a strong correlation with other psychological factors, for school leaders and teachers in the Netherlands there is no direct relationship between attitude and inquiry-based working. Perhaps the relationship between psychological factors and inquiry-based working is related to the culture of each country, or psychological factors play different role in either data use and in inquiry-based working.

Our research sought for ways in which educators could be encouraged to work in an inquiry-based manner. There is not a lot of research on the way in which educators at different levels in the school organization influence each other in their inquiry-based working (Schildkamp et al., 2012). Anderson et al. (2010) found four approaches that school boards can use to stimulate school leaders in their inquiry-based working: modeling behavior, having high expectations, developing internal expertise to support inquiry; and providing money, time, and space. Our study, as described in Chapter 5, added to this knowledge and showed a wide variety of 13 ways in which boards can stimulate school leaders to work in an inquiry-based manner. In addition to Andersons' four approaches we found: discussing student results together with school leaders, encouraging school leaders to discuss student results with teachers, sharing knowledge, making demands regarding inquiry-based working, encouraging leaders to discuss research results with school leaders from other schools, involving external organizations, so as to help school leaders conduct research in a more professional manner, communicating about the vision for inquiry-based working, trusting and believing; and being open to new ideas concerning research.

In addition, we found 15 ways in which school leaders stimulated teachers' inquiry-based working. Six of these approaches involve school leaders stimulating teachers' inquiry habit of mind: discuss student results with them, encourage teachers to discuss data with each other, share knowledge, model behavior, make demands, and have high expectations. Jimerson (2014) pointed out that school leaders should support teachers' effective use of data. We found four ways in which school leaders accomplish that task: involve external organizations, so as to support teachers in conducting research, train teachers in research skills, hand out step-by-step instructions regarding research skills, and shape the school into an "academic primary school." Finally, we found 5 more ways in which school leaders stimulated teachers' inquiry-based working: communicate a vision for inquiry-based working, share leadership with teachers, provide money, time, and space, be open to new ideas concerning research, and create a safe environment.

In Chapter 2 and 3 we described that it is important for school leaders to pay attention to psychological factors that might influence teachers' inquiry-based working. Several of the mentioned approaches might indeed stimulate teachers' attitude, experienced social pressure, self-efficacy or collective efficacy regarding inquiry-based working. For example, leaders who encourage teachers to discuss data with each other might stimulate with this approach their teachers' collective efficacy. Leaders (or boards) who communicate a vision for inquiry-based working might stimulate teachers' (or leaders') positive attitude towards it. And leaders (boards) making demands might increase teachers' (leaders') experienced social pressure.

No research so far studied the potential influence of teachers on school leaders' inquiry-based working, or the potential influence of school leaders on school boards' inquiry-based working. The contribution of this dissertation to the existing literature is that this research increases the insight in the interplay between school boards, school leaders, and teachers regarding inquiry-based working. We found that inquiry-based working is highly stimulated top-down: from board to leaders and from leaders to teachers. However, we also found several examples of influence the other way around: from teachers to leaders, and from leaders to boards. For example school leaders and teachers asked critical questions to respectively school boards and school leaders. Teachers modelled behavior and school leaders made their board more aware of issues that needed to be investigated. Knowing that the interplay between boards, leaders, and teachers influences their inquiry-based working is an important insight in stimulating inquiry-based working in schools.



We were also interested in the influence of teachers' inquiry-based working on students' curiosity and critical thinking habits. Previous meta-analyses of Furtak et al. (2012) indicated a connection between inquiry-based teaching and improved student learning. However, there is no research on whether teachers' inquiry-based working also stimulates students' inquiry habit of mind (curiosity and critical thinking habits). We found that at the school level, teachers can influence the curiosity of students in several ways, for example by working with an inquiry habit of mind, or by stimulating students' data literacy. However, none of the aspects of teachers' inquiry-based working in schools or related psychological factors appeared to have any effect on students' critical thinking habits. Perhaps, stimulating students' inquiry-habit of mind for teachers means encouraging curiosity, with less emphasis on promoting critical thinking. On the other hand, the case study illustrated that in a school in which teachers continuously focus on stimulating students' inquiry habit of mind, students were both more curious and more critical. The reason for this difference might be caused by the research method: quantitative by using a questionnaire or qualitative by using interviews and observations. The qualitative study made it possible to ask supplementary questions which made clear that when teachers strongly stimulate students' inquiry habit of mind their students are curious and possess critical thinking habits.

### **Methodological considerations**

In this study, we used both quantitative and qualitative approaches. We started this research with a quantitative survey amongst school boards, school leaders, teachers and students. Subsequently, we used an embedded multiple-case study design (Yin, 2012) to investigate three schools that scored average to high on inquiry-based working in the survey. In this way, information regarding inquiry-based working was obtained in different ways. The case study results helped explain the survey responses, and provided a more complete picture of school boards', school leaders', and teachers' inquiry-based working and students' inquiry habit of mind. For instance, the survey results indicated that school leaders encouraged teachers to discuss data with each other. The case study results showed that one way of doing this was by prompting teachers to observe each other in the classroom and discuss the strengths and weaknesses of each other's teaching techniques. We therefore recommend to perform not only quantitative, but also qualitative measurements while conducting research, as the qualitative results can deepen the quantitative results.

In Chapter 4 we described the mixed-method study on the relationship between teachers' inquiry-based working and students' inquiry habit of mind. The questionnaire for teachers was based on existing instruments. The questionnaire to investigate the degree to which students have an inquiry habit of mind, was developed specifically for this study. There was no straightforward way of linking teachers and students, because some teachers taught in more than one class, while some students had more than one teacher. To solve this issue, we aggregated both the teacher and the student data at the school level.

### **Limitations and directions for further research**

A limitation of this study is that only a small number of the invited school boards participated with their schools. In future research it might be a better option to invite school leaders to participate with their boards, instead of inviting school boards to participate with their schools.

Secondly, a limitation of the survey concerns the fact that self-reports were used (see e.g. Schwartz, 1999). Self-reports reflect participants' own perceptions. The disadvantage of this is that people tend to respond socially desirable (see e.g. Batista-Foguet, Revilla, Saris, Boyatzis and Serlavós, 2014). The use of complementary qualitative research contributed to more insight into school boards', school leaders' and teachers' actual inquiry-based working. A larger qualitative research in more schools would gain even more insight in this matter.

The study presented in chapter 4 focussed on students' curiosity and critical thinking habits. The third limitation concerns the fact that we had to aggregate both the teacher data and the student data at the school level. The reason for this was that some teachers taught in more than one class, while some students had more than one teacher. This means that no straightforward link between teachers and students can be made. Since many teachers in the Netherlands have part-time jobs in which two or more teachers share a class together, it is difficult to prevent this.

Based on the results of this study, several other suggestions for future research can be made. Future research could make clear whether there is a mutual influence on inquiry-based working between teachers and students. Perhaps not only teachers have an effect on their students' inquiry habit of mind, but students also have an effect on their teachers' inquiry-based working.

In Chapter 5 we described 3 schools at which we conducted our case study research. Each of these three schools had their own reasons and their own vision for inquiry-based working. The question is whether their reasons are representative of other schools, or that there exist other reasons why schools work this way. To gain insight in such underlying visions and describe these, might encourage other schools to follow these examples because they recognize themselves in the outlined stories.

A final suggestion for further research is to use action research as a method to experiment with new approaches to stimulate inquiry-based working in schools. In this way the strategies to encourage inquiry-based working, as described in Chapter 5, could be supplemented and deepened.

### **Implications for practice and policy**

From a practical perspective, our findings are directly relevant not only for school boards and school leaders who want to stimulate inquiry-based working in their schools, but also for educators of school leaders and teachers and for the design of professional development initiatives on this matter. Our findings confirm the conclusions of Vanhoof et al. (2014) that if we want to increase inquiry-based working by teachers, it is not enough to provide knowledge and skills regarding data use. Our study showed that we also need to enhance educators' self-efficacy and collective efficacy, as well as their attitude. In addition, social pressure also helps. Self-efficacy and collective efficacy can be enhanced by collaborating in peer groups, talking about each other's capabilities, discovering each person's strengths, and giving positive feedback. In order to promote a positive attitude and enact social pressure the benefits of inquiry-based working for educational quality should be emphasized by school boards, school leaders and educators of school leaders and teachers.

To promote students' curiosity, teachers can create a culture of inquiry in the classroom. This means, for example, teaching students how to work with learning questions and research questions, being open to students' ideas and questions, and facilitating inquiry by providing research materials and having students work together in small groups. Chapter 4 provided several approaches of teachers that could stimulate both students' curiosity and critical thinking habits. Teacher educators can use these approaches in their teaching to model these type of skills to student teachers.

The study presented in chapter 5 indicated that 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. In addition, school boards (leaders) should involve school leaders (teachers) in their own data-based decision making. Not only when student assessment data is involved, but also when it comes to decisions at the school level regarding, for example, policy development and planning.

When national policy-makers want to stimulate the broader inquiry-based working in primary schools, they should not only focus on using assessment data in schools, but on the broad spectrum of inquiry-based working, including creating a culture of inquiry in schools. Educators of leaders and teachers could focus on the interventions each of them can undertake to stimulate this type of working in the school organization, not only top-down, but also bottom-up.