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Citation for published version (APA):

Inquiry-based leadership
The influence of affective attitude, experienced social pressure and self-efficacy

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Abstract
Purpose – The purpose of this paper is to improve the understanding of psychological factors that influence inquiry-based leadership. This study investigates how affective attitude, experienced social pressure, and self-efficacy relate to aspects of inquiry-based school leadership. A school leader's inquiry habit of mind, data literacy, and the extent to which he or she creates a culture of inquiry in the school are each identified as aspects of inquiry-based leadership.
Design/methodology/approach – Data were collected from questionnaires completed by a sample of 79 school leaders.
Findings – A significant relationship was found between self-efficacy regarding inquiry-based leadership and all aspects of inquiry-based leadership. Affective attitude toward inquiry-based leadership was significantly related to creating a culture of inquiry. There was no unique relationship between experienced social pressure and inquiry-based leadership.
Practical implications – Administrators and educators of school leaders who aim to stimulate inquiry-based school leadership should not only focus on increasing the capacity of school leaders to lead their school in an inquiry-based way, but they should also focus on leaders' self-efficacy and on fostering leaders' positive attitude toward inquiry-based school leadership. Administrators and educators can, for example, give positive feedback, emphasize the added value of inquiry-based leadership, encourage working with critical friends, and stimulate collaboration with other leaders.
Originality/value – This study addresses two gaps in the existing research, by focusing on inquiry-based leadership instead of data use and on psychological factors instead of knowledge and skills that are related to this type of leadership.
Keywords Leadership, Educational research, Self-efficacy, Data use, Inquiry-based leadership, School leaders
Paper type Research paper

Introduction
Schools are held increasingly accountable for their output in terms of student achievement. In countries worldwide, schools are more and more expected to provide stakeholders with data that illustrate the quality of their education and to effectively use these data as the basis for the improvement of student performance (Earl and Katz, 2006; Lai and Schildkamp, 2013; Organisation for Economic Co-operation and Development, 2013; Vanhoof *et al.*, 2014). At the same time, schools in the Netherlands are more and more allowed to make their own decisions with regard to the education they provide in order to reach these results. As a result, school leaders and teachers are expected to use data as the basis of their decisions at school and classroom level (Schildkamp and Kuiper, 2010; Vanhoof *et al.*, 2014).

Using data as the basis for school improvement implies that school leaders and teachers should engage in collaborative inquiry and that they should base educational decisions on the results of this inquiry. Next to being able to use data for school improvement themselves, school leaders also need to be able to create and give guidance to a culture of inquiry in which teachers are stimulated to collaboratively use data. They will have to communicate a clear

vision on inquiry-based working and stimulate teachers' inquiry habit of mind and data literacy. Several studies have focused on factors that promote and hinder data use in schools (e.g. Ikemoto and Marsh, 2007; Jimerson, 2014; Katz and Dack, 2014; Schildkamp *et al.*, 2014; Schildkamp and Kuiper, 2010; Schildkamp, Rekers-Mombarg and Harms, 2012). Others have focused on the influence of district leadership (e.g. Lee *et al.*, 2012; Levin and Datnow, 2012; Wayman *et al.*, 2012) or on the way that school leaders may best support an increasing capacity for data use (e.g. Anderson *et al.*, 2010; Daly, 2012; Ikemoto and Marsh, 2007; Mandinach, 2012; Schildkamp, Ehren and Lai, 2012).

All of these international studies emphasize the importance of effective leadership and school culture for encouraging an increased use of data in schools. However, inquiry-based leadership differs from the more standard "data use by school leaders" in the sense that it does not focus on leaders using data but, instead, encourages an approach within schools where inquiry together with the use of data is at the center. This requires school leaders to work with an inquiry habit of mind, to be data literate, and to create a culture of inquiry (Earl and Katz, 2006; Krüger and Geijsel, 2011). None of the aforementioned studies have explicitly studied the capacities that school leaders need for leading inquiry-based working in schools, nor the psychological factors that might influence this type of leadership.

Research on school leaders' capacities for inquiry-based leadership in schools appears to be rare. This study addresses two gaps in the literature. First, while data use by school leaders is well researched, studies on school leaders leading inquiry-based working have hardly been done. Focusing on inquiry-based leadership instead of data use by school leaders will add to the existing knowledge base of effective leadership for school improvement associated with data use in schools. This research will give more insight in the way school leaders stimulate data use by teachers and in the way they create a culture of inquiry. Second, while the knowledge and skills of school leaders using data have been studied, little is known about the psychological factors that may influence the extent to which inquiry-based school leadership is carried out.

Numerous studies have shown that psychological factors such as attitude, experienced social pressure, and self-efficacy influence people's performance, persistence and motivation when carrying out tasks (e.g. Ajzen, 2002b; Bandura, 1997; Fishbein and Ajzen, 2010; Geijsel *et al.*, 2009; Sanbonmatsu and Fazio, 1990). Research on such psychological factors in school leadership is scarce, but the study by Vanhoof *et al.* (2014) found that attitude and self-efficacy have a significant relationship to data use by principals. They also found that there is a small positive correlation between external expectations and the use of data by principals. Systematic research in which psychological factors are investigated in relation to inquiry-based leadership is lacking.

To address the two gaps in research so far, this study examines how the psychological factors attitude, experienced social pressure, and self-efficacy regarding inquiry-based leadership relate to the following aspects of inquiry-based leadership: working with an inquiry habit of mind, being data literate, and creating a culture of inquiry. The purpose of this study is to improve our understanding of inquiry-based leadership, and to provide administrators and educators of school leaders with knowledge about how to stimulate school leaders' inquiry-based leadership.

Theoretical framework
Inquiry-based leadership
Inquiry-based leadership is an aspect of leadership which can complement leading concepts such as transformational, transactional, instructional, or distributed leadership. It is not a new type of leadership, but a quality that can accompany existing leadership styles. For example, Daly (2012) in his literature review on data use and social networks points out

that several studies indicate the importance of a more distributed approach to data use in schools, implying that distributed leadership can very well be combined with inquiry-based leadership. In addition, Halverson *et al.* (2007) combine leading data use in schools with instructional leadership. They introduce "new instructional leadership" which involves the ability of leaders to meet the demands of external accountability. New instructional leaders will require knowledge and frameworks to guide their schools in the use of accountability data and structures that result in systematic improvements in student learning (Halverson *et al.*, 2007). Also research of Lachat and Smith (2005) provides evidence that school leaders can play mutual roles in fostering widespread use of data in schools.

Daly (2012) points out that many studies suggest that leaders may not have the skill sets to model and enact the leadership necessary to support data use. This might be because leaders are primarily driven by their necessary data skills and not by developing social relations in enacting the use of data (Daly, 2012). According to Earl and Katz (2006) and Krüger and Geijsel (2011), inquiry-based leadership requires the following capacities: to be able to work with an inquiry habit of mind, to be data literate, and to be able to create a culture of inquiry. A capacity is defined as the ability to perform specific behavior (Fishbein and Ajzen, 2010). A school leader's capacity includes more than knowledge and skills, as Fullan (2008) points out. It also involves using resources wisely, and committing to get important things done collectively and continuously. A capacity refers to a combination of skills and knowledge, attitudes and actions taken together, aimed at generating results.

The first capacity – being able to work with an inquiry habit of mind – means having a mindset in which the leader always wants to know more. According to Earl and Katz (2006), school leaders with an inquiry habit of mind value deep understanding tend to reserve judgment, examine a range of perspectives, and systematically pose increasingly focused questions. In addition, research by Van der Rijst *et al.* (2008) distinguishes characteristics such as an inclination to achieve (being passionate and persistent), an inclination to be critical (being honest and critical to self and others), an inclination to know (being curious and excited), and an inclination to understand (taking an overview and wanting to scrutinize). In this study, the inquiry habit of mind is examined in a behavioral sense such as showing a tendency to systematically pose questions or to read literature to gain knowledge. Therefore, the inquiry habit of mind is different from the concept "attitude," which, in this research, is used as a psychological factor.

The second capacity that is required for inquiry-based leadership is to be data literate. This can be defined as the ability to understand and use data effectively to inform decisions (Mandinach and Gummer, 2013). According to Krüger (2010a), school leaders, to some extent, must be able to collect data, which they should be able to read, understand, analyze, and interpret.

In their study on the purposes for which school leaders use data, Schildkamp and Kuiper (2010) found that school leaders do collect and analyze data, for example, for policy development and to evaluate the functioning of teachers. However, they do not systematically apply the outcomes to innovate school-wide curricula or improve school performance. Mandinach and Gummer (2013) point out that data literacy requires a specific skill set: "These skills include knowing how to identify, collect, organize, analyze, summarize, and prioritize data. They also include how to develop hypotheses, identify problems, interpret the data, and determine, plan, implement, and monitor courses of action" (p. 30).

In this current study, school leaders' perceptions of their own data literacy are measured. Being data literate in this study means setting a goal before gathering data, being able to analyze and interpret data, and report results to others (based on Earl and Katz, 2006). For the purpose of this study, data are defined broadly and include all the relevant

information that teachers and schools need for decision-making, including both qualitative and quantitative data at the school, class, and individual student levels.

For the third capacity of inquiry-based leadership – being able to create a culture of inquiry – the question is no longer whether teachers should use data, but how they can be supported to use data well (Jimerson, 2014). This is, according to Jimerson (2014), because data alone cannot answer questions. By collaboratively synthesizing and organizing data in different ways, it is transformed into information, knowledge and ultimately into constructive action (Earl and Katz, 2006; Jimerson, 2014). According to Daly (2012), the interpretation and use of data takes place not only within the individual but also in social processes between educators who, through interaction, co-construct and make sense of data. This requires school leaders to lead internal research processes and to organize dialogue in the school in order to make sense of data as a team (Krüger, 2010a). School leaders who create this kind of culture of inquiry in schools communicate a clear vision on inquiry-based working and stimulate both teachers' inquiry habit of mind and data literacy (Earl and Katz, 2006; Krüger, 2010a). Therefore, this study measures the capacity of school leaders to create a culture of inquiry in school by examining the following three aspects: communicating a vision on inquiry-based working, stimulating teachers' inquiry habit of mind, and stimulating teachers' data literacy.

The first aspect of creating a culture of inquiry is communicating a vision on inquiry-based working. The capacity of school leaders to communicate a vision has been found to be of great importance in influencing teacher behavior. For example, research by Geijsel et al. (2009) indicates that the extent to which teachers perceive school leadership to involve initiating and identifying a vision has an influence on the degree to which they are willing to constructively change their practice. Wayman et al. (2009) found in their study that successful leaders tend to be strong supporters and promoters of data use, they search for ways to demonstrate value in data, they disseminate findings from data and they make clear the benefits and efficiencies of using data. In line with this, Schildkamp and Kuiper (2010) found that communication of a clear vision as well as established norms and goals for data use is an important factor in encouraging data use by teachers. In addition, Schildkamp and Kuiper (2010) point out that a vision should be incorporated into goals set both for student progress and for teachers' and school leaders' own professional learning. In line with the above, the concept of communicating a vision in this study is interpreted as: spreading and strengthening positive values and norms related to inquiry-based working in school.

The second aspect of creating a culture of inquiry in school – stimulating the inquiry habit of mind of teachers – involves encouraging teachers to adopt a mindset that is characterized by a constant wish to know more, by an honest and critical approach to self and others, and by an inclination to seek understanding and to achieve (based on Van der Rijst et al., 2008). School leaders can stimulate the inquiry habit of mind of teachers, for example, by encouraging the use of research literature and the data that is available in school (Earl and Katz, 2006; Krüger, 2010a). A supporting school leader appears to be an important factor in enabling teachers to effectively use data (Schildkamp and Kuiper, 2010). In line with the first capacity (working with an inquiry habit of mind oneself), based on Van der Rijst et al. (2008), in this study stimulating teachers' inquiry habit of mind is interpreted as: stimulating an internal sense of wanting to understand, wanting to know, and wanting to share.

The third aspect of creating a culture of inquiry – school leaders stimulating data literacy among teachers – draws on the findings of Schildkamp and Kuiper (2010) that teachers experience difficulty in analyzing and interpreting data. Wayman et al. (2009) point out that teachers need professional support and leadership to help them to turn student data into information that can inform classroom practice. Also Schildkamp and Kuiper (2010) found in their study that teachers seem to be more effective in data use when support and encouragement is given by school leaders. School leaders stimulating teachers' data literacy

in this study is interpreted as: encouraging teachers to conduct research on their own classroom practice, and organizing forms of professionalization for teachers aimed at enabling them to become competent in using data.

Attitude, experienced social pressure, and self-efficacy regarding inquiry-based leadership
The second gap in research on inquiry-based leadership is caused by the focus on knowledge and skills to use data, while psychological factors that may influence inquiry-based leadership are neglected. According to the theory of planned behavior of Ajzen (1991, 2002b), human behavior and human intentions to perform a specific behavior can be predicted by three psychological factors: attitude toward the behavior, experienced social pressure with respect to a given behavior, and self-efficacy in relation to the behavior. The more favorable the attitude and experienced social pressure, and the greater the self-efficacy, the stronger should be the person's intention to perform the behavior in question. People are expected to carry out their intentions when the opportunity arises (Ajzen, 2002b).

The specific behavior which is investigated in this study is inquiry-based leadership. This behavior is subdivided in three capacities. The capacities working with an inquiry habit of mind and creating a culture of inquiry both refer to a specific set of behaviors. Data literacy of school leaders should rather be understood as a skill than as a behavior. However, for the purpose of this study, we investigated the relationship between the psychological factors and all three capacities of inquiry-based leadership.

A school leader's attitude toward inquiry-based leadership can be defined as the tendency to respond with some degree of favor toward it: an evaluative dimension with respect to inquiry-based leadership that ranges from negative to positive through a neutral point. Vanhoof *et al.* (2014), who make the distinction between cognitive and affective attitude, note that the affective dimension of attitude has a major influence on data use by principals. A positive affective attitude toward data use appears to have a positive influence on the degree to which school leaders use data (Vanhoof *et al.*, 2014). Because the broader inquiry-based leadership differs from data use by school leaders, this study investigates whether attitude also relates to the extent to which school leaders lead their schools in an inquiry-based manner.

A second factor that may play a role in the extent to which school leaders lead their school in an inquiry-based way is that school leaders may feel under pressure to do so. Different types of pressure can be distinguished, for example, the pressure of accountability, caused by demands from administrators or the inspectorate. Schildkamp and Kuiper (2010) found that this type of pressure, combined with support, stimulates schools to use data. In addition, Vanhoof *et al.* (2014) found a positive indirect relationship between accountability-orientated external expectations and the use of data by school principals. These results seem quite logical – when schools are mandated to use data, school leaders have no alternative, other than to do so. This differs, however, from another type of pressure that school leaders may feel, namely, social pressure. Social pressure has two aspects: social approval and normative pressure (Fishbein and Ajzen, 2010). Social approval refers to the belief that others do or do not want us to perform a given behavior (e.g. believing that teachers or parents want school leaders to lead the school in an inquiry-based way). Normative pressure refers to the perception of how others engage in a particular behavior (e.g. believing that other school leaders are also leading their schools in an inquiry-based way). This study focuses on both of these aspects of experienced social pressure.

The third psychological factor studied that may be related to inquiry-based leadership is self-efficacy. Self-efficacy is receiving continued attention in educational research (Kleinsasser, 2014). It is defined as believing for oneself that a specific behavior can be performed successfully and the conviction and self-belief that it is possible to organize and execute the actions required in order to produce given levels of attainment (Bandura, 1997). As Fisher (2014) points out, self-efficacy is task specific and differs from self-esteem of self-concept, which reflect more general affective evaluations. Evidence suggests (Bandura, 1997;

Geijsel *et al.*, 2009) that people with a high sense of self-efficacy set themselves challenges, and are more likely to take risks and to experiment. They are also more creative in their learning, thinking, and work. Self-efficacy also appears to play a major role in explaining behavior in schools. For example, research by Vanhoof *et al.* (2014) shows that self-efficacy has an effect on data use by school leaders. Self-efficacy appears to have a strong positive influence on the inquiry habit of mind and data literacy of secondary school teachers (Krüger and Geijsel, 2011). In line with this, it may be expected that self-efficacy has an impact on school leaders' tendency to work with an inquiry habit of mind and to be data literate. It is likely that it affects the capacity of school leaders to create a culture of inquiry. In this study school leaders' self-efficacy is interpreted as: belief in the likely personal success of conducting inquiry-based leadership.

Background characteristics
A meta-analysis of 95 studies by Paustian-Underdahl *et al.* (2014) on gender and leadership effectiveness shows that, when asked to rate their personal effectiveness, men tend to rate themselves significantly more highly than women do. However, when the ratings of others are used, women tend to be rated more highly. They also found that female leaders were rated as significantly more effective than male leaders in business organizations, whereas male leaders were rated more effective in government organizations. Other studies that focus on leaders in school organizations also show a relationship between gender and leadership (e.g. Brinia, 2012; Chaturvedi *et al.*, 2012; Krüger *et al.*, 2007). In line with this, it may be expected that gender also has a relationship to inquiry-based leadership. In addition, it should be noted that this study includes age and educational level as background characteristics. There may be a difference between younger and older school leaders or between school leaders who either do or do not have their master's degree.

Primary schools in the Netherlands usually have one principal and at least one middle manager. In this study, both of these functions are included when referring to school leaders. To indicate the amount of time that a person is employed, the unit full-time equivalent (FTE) is used in the Netherlands. An FTE of 1.0 is equivalent to a full-time worker. Both aspects (function and FTE) are taken into account in this study as background characteristics.

Current study
This study investigates the relationship between the explanatory variables of attitude, experienced social pressure and self-efficacy regarding inquiry-based leadership and the dependent variables of aspects of inquiry-based leadership by school leaders of primary schools in the Netherlands. The research question is:

RQ1. How are attitude, experienced social pressure, and self-efficacy related to inquiry-based leadership of primary schools?

The conceptual model is shown in Figure 1.
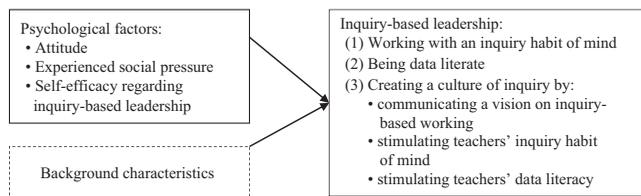
Note: For the ease of presentation the variables of inquiry-based leadership by school leaders are presented in one rectangle as well as the different psychological factors

Figure 1.
Conceptual model

Based on the theory mentioned in the theoretical framework and given the background characteristics, this paper has hypothesized the following:

H1. School leaders with positive attitudes toward inquiry-based leadership will lead their schools to a larger extent inquiry-based than school leaders with less positive attitudes.

H2. School leaders who experience more social pressure regarding inquiry-based leadership will lead their schools to a larger extent inquiry-based than school leaders who experience less social pressure.

H3. School leaders with a high sense of self-efficacy toward inquiry-based leadership will lead their schools to a larger extent inquiry-based then those school leaders who have a lower sense of self-efficacy.

Dutch educational system

In the Netherlands, children attend primary school between the ages of 4-12 years. The Dutch primary school has eight grades. Primary education is characterized by a variety of management structures. There can be a diversity of structures with several layers of management but there are also traditional schools with one school leader. In addition to the traditional director (principal) there can be school leaders in the function of, for example, a deputy director, a location manager, or a unit leader (leading e.g. grades 5-8). Different boards describe these functions differently, but all agree these functions are in the layer of middle management.

One of the essential characteristics of Dutch education is that schools are relatively autonomous. Dutch schools are free to choose the religious, ideological, and pedagogical principles on which they base their education, as well as how they organize their teaching activities. There are both public and private schools, which are both funded by the government. In primary education, students with a potential educational disadvantage are given a weighting based on the parents' level of education. On the basis of these weightings, schools receive extra staff and other resources. This means that disadvantaged students bring almost twice as much funding as regular students (Ladd and Fiske, 2011).

All schools are overseen by a school board that monitors progress and provides support. Almost half of the school boards in the Netherlands (46 percent) are responsible for only one school each, whereas large boards might have several dozen schools under supervision. As Ladd and Fiske (2011) point out, this means that there are many boards in one city. For example, Amsterdam has 43 separate boards operating from 1 to 16 schools. School board members are appointed, and are therefore more like trustees than representatives (Scheerens, 2016).

There is no national curriculum in the Netherlands; consequently, there is a variety in the way the curriculum is shaped. This freedom may 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: the subjects to be studied, the attainment targets, the number of teaching hours per year, the qualifications required for teachers, and so on. The education inspectorate is responsible for maintaining the quality of education and holds schools accountable for their education.

Method

Participants

We used a two-step method to invite schools to participate in this study. Because a low response was expected as a result of research fatigue in Dutch schools, in step 1, all 1,046 school boards of primary schools in the Netherlands were invited to participate with their schools in this study. Invitations were sent twice by mail, social media was used to draw attention to this study, and the researchers' networks were used to more personally invite school boards. In total, 33 school boards (3.2 percent) responded positively. In step 2, after the permission was granted by the

school board, a web-based survey was sent out to school boards, school leaders, teachers, and students. Responses were received from 27 school boards (82 percent). For this part of the study, the responses received were from 79 school leaders from 61 schools.

Most of the participating schools (66 percent) were situated in the east and south of the Netherlands. This is in line with the national average: 69 percent (source: www.stamos.nl). In total, 46 participants indicated to have the function of "principal." From these principals, 44 percent were female, which is also in line with the national average (43 percent) (Ministerie van Onderwijs, Cultuur en Wetenschap, 2013). In the Netherlands, the most sizable primary school types are: public (33 percent), Protestant Christian (30 percent), and Roman Catholic (30 percent) (Ministerie van Onderwijs, Cultuur en Wetenschap, 2013). The schools participating in this study are 9 percent public, 48 percent Protestant Christian, and 32 percent Roman Catholic. The proportion of public schools represented in this study is not in line with the national figures and so this requires a careful interpretation of results regarding public schools.

Table I shows the background characteristics of the participants. It shows that most participants are female (60 percent). Most of them work more than 0.8 FTE (65 percent) and almost half of them (48 percent) have a master's degree. Participants are primarily in their 30s (29 percent), 40s (25 percent), or 50s (36 percent), and their function is mostly principal (58 percent).

Procedures
In each case, after both school board and school leader agreed to participate in this study, school leaders received a link to the survey. Data collection took place between November 2012 and March 2013.

Outcomes	n	%
Background characteristics		
Gender		
Male	31	40
Female	47	60
Age		
$\leqslant 20$	0	0
21-30	4	5
31-40	22	29
41-50	19	25
51-60	28	36
$\geqslant 61$	4	5
Function		
Principal	46	58
Deputy principal	11	14
Location manager	7	9
Other leaders	15	19
FTE		
$\leqslant 0.2$	0	0
> 0.2 and $\leqslant 0.5$	9	11
> 0.5 and $\leqslant 0.8$	19	24
> 0.8	51	65
Educational level		
Bachelor's degree from a university of applied sciences	40	51
Master's degree from a university of applied sciences	34	43
Bachelor's degree from a research university	1	1
Master's degree from a research university	4	5

Table I.
Background characteristics of sample

Instruments

The explanatory and dependent variables measured in this survey consisted of 41 items rated on a four-point Likert scale: completely disagree, partly disagree, partly agree, completely agree. To verify the content validity of the items, experts (i.e. four teachers, two school leaders and two educational consultants) reviewed item formulations. The instruments used to measure the aspects of inquiry-based leadership were based on existing instruments of Krüger (2010b). The original validated scales had Cronbach's α coefficients between 0.76 and 0.89 (Krüger, 2010b). Item formulation was adjusted from teacher perspective to school leader perspective where necessary. The scale being data literate was complemented with one item of Earl and Katz (2006) and one newly formulated item.

The instrument used to measure self-efficacy regarding inquiry-based leadership was based on an existing scale from Krüger (2010b) (with Cronbach's $\alpha = 0.84$) supplemented with one item from Visser-Wijnveen *et al.* (2012). Again item formulation was adjusted from teacher perspective to school leader perspective.

The items used to measure attitude toward inquiry-based working were created by the researcher, through reformulating items from a scale regarding a more general attitude toward teaching that had previously been used in the Netherlands (Visser-Wijnveen *et al.*, 2012). Item formulations were adjusted to inquiry-based leadership. The scale for experienced social pressure was based on the work of Fishbein and Ajzen (2010). Ajzen (2002a) only gives sample items for illustrative purposes. Based on these sample items a new scale was constructed. One item of the scale experienced social pressure was negatively formulated: "Whether or not I lead my school in an inquiry-based way is completely up to me." This item was eliminated from the scale due to a negative correlation with the other four items, after recoding. Because new scales were formed for attitude and experienced social pressure, Cronbach's α coefficients can only be reported for the current sample. The preliminary analyses show that scale reliability for experienced social pressure is relatively low (Cronbach's $\alpha = 0.59$). The reliability of all other scales is reasonable or good. All scales were constructed by averaging the item scores. Table II shows the number of items and the Cronbach's α of each scale and includes a

Scale	Number of items	Cronbach's α
Working with an inquiry habit of mind	5	0.67
In my work I value deep understanding		
Being data literate	6	0.79
I am knowledgeable about statistical concepts		
Creating a culture of inquiry by		
Communicating a vision on inquiry-based working	4	0.80
I explain to the team the relationship between available data and the school's vision		
Stimulating the inquiry habit of mind of teachers	6	0.80
I involve teachers in interpreting data about the school		
Stimulating data literacy of teachers	5	0.80
I stimulate teachers to research their own teaching and/or issues at school level		
Attitude toward inquiry-based leadership	5	0.84
I enjoy inquiry-based leadership		
Experienced social pressure regarding inquiry-based leadership	4	0.59
Most people whose opinion I value think I should lead my school in an inquiry-based way		
Self-efficacy regarding inquiry-based leadership	5	0.84
I am confident I have the skills to lead my school in an inquiry-based way		
Note: The text in italics is a sample item for the scale in question		

Table II.
Overview of the
survey instrument

sample item per scale. The reliability scores demonstrate that these scales can be trusted for use in the analyses in this study.

The background characteristics were measured with five additional items. Gender was coded as $0 =$ female and $1 =$ male. To measure age, respondents chose between five ordered options: $\leqslant 20$; 21-30; 31-40; 41-50; 51-60; $\geqslant 61$ and these were coded, respectively, as 0, 1, 2, 3, 4, and 5. As noted above, primary schools in the Netherlands normally have one principal and at least one middle manager. Schools may use different terms for middle managers such as deputy principal or location manager. Therefore, to measure function, respondents could answer "principal," "deputy principal," "location manager," or "other leaders." Principal was coded as 1 while the other three answers were coded as 0. This facilitates the ability to discern whether or not the respondent is a principal.

FTE was measured using the scale: $\leqslant 0.2$; > 0.2 and $\leqslant 0.5$; > 0.5 and $\leqslant 0.8$; > 0.8. The answer > 0.8 is interpreted as working full-time and was coded as 1. The other options were interpreted as working part time and were coded as 0. Educational level was measured by asking what the respondents' highest level of education is. The answer categories were in line with the Dutch educational system: bachelor's degree from a university of applied sciences, master's degree from a university of applied sciences, bachelor's degree from a research university, master's degree from a research university. The responses were coded as $0 =$ bachelor's degree; $1 =$ master's degree.

Statistical analysis
Since school leaders are sometimes employed within the same school board, their observations could be dependent. However, intraclass correlations reflecting possible dependence between observed scores of school leaders from the same school board were not significant (working with an inquiry habit of mind: $F(57, 21) = 0.75$, $p = 0.81$; being data literate: $F(57, 21) = 0.72$, $p = 0.84$; communicating a vision on inquiry-based working: $F(57, 21) = 0.92$, $p = 0.62$; stimulating the inquiry habit of mind of teachers: $F(57, 21) = 1.01$, $p = 0.51$; stimulating data literacy of teachers: $F(57, 21) = 1.47$, $p = 0.17$). Therefore, first a standard regression was performed between the background characteristics as independent variables and the aspects of inquiry-based leadership as dependent variables.

Subsequently, a standard regression was performed between the three predictors from the hypothesis (attitude, experienced social pressure, and self-efficacy regarding inquiry-based leadership) and the aspects of inquiry-based leadership as dependent variables, with significant background characteristics as observed from the first analysis as additional predictors. To investigate the correlation between attitude, experienced social pressure, and self-efficacy and the aspects of inquiry-based leadership, Pearson product-moment correlation coefficients were computed. Results were called statistically significant for p-values at or below 0.05.

Results
The mean scores of the scales measuring the different aspects of inquiry-based leadership are between 3.08 and 3.39, as can be seen in Table III. For the three psychological factors with regard to inquiry-based leadership, the mean scores are between 2.95 and 3.48. Bearing in mind that the midpoint of the assessment scale is 2.5, the results indicate that respondents score as moderately positive on the scales measuring inquiry-based leadership as well as the measured psychological factors. Since school leaders filled out the questionnaire themselves, all scores measure the school leaders' perceptions.

Table IV displays the regression coefficients (b), the standard errors, the p-values (p), and the proportions of explained variance (R^2) of the regression analyses of aspects of inquiry-based leadership on the background characteristics. Since all background characteristics were entered in the regression equations simultaneously, any parameter for the separate characteristics should be interpreted as the estimated relationship with

Scale	n	m	SD
Inquiry-based leadership			
Working with an inquiry habit of mind	79	3.39	0.38
Being data literate	79	3.37	0.41
Creating a culture of inquiry by			
Communicating a vision on inquiry-based working	79	3.16	0.54
Stimulating the inquiry habit of mind of teachers	79	3.29	0.46
Stimulating data literacy of teachers	79	3.08	0.57
Psychological factors			
Attitude	79	3.48	0.45
Experienced social pressure	79	2.95	0.47
Self-efficacy regarding inquiry-based leadership	79	3.03	0.52

Notes: Answer categories: 1 = completely disagree; 2 = partly disagree; 3 = partly agree; 4 = completely agree. *n*, sample size; *m*, mean item scores; SD, standard deviation

Table III.
Descriptive statistics of used scales

	Working with an inquiry habit of mind		Being data literate		Communicating a vision on inquiry-based working		Creating a culture of inquiry by Stimulating the inquiry habit of mind of teachers		Stimulating data literacy of teachers	
	b (SE)	p	b (SE)	p	b (SE)	p	b (SE)	p	b (SE)	p
Intercept	2.92 (0.13)	0.00	2.94 (0.15)	0.00	2.36 (0.18)	0.00	2.53 (0.15)	0.00	2.17 (0.19)	0.00
Gender	−0.12 (0.09)	0.20	−0.10 (0.11)	0.35	−0.05 (0.13)	0.71	−0.06 (0.11)	0.60	−0.17 (0.13)	0.22
Age	0.12 (0.04)	*0.01*	0.08 (0.05)	0.10	0.14 (0.06)	*0.02*	0.17 (0.05)	*0.00*	0.22 (0.06)	*0.00*
Function	−0.04 (0.09)	0.71	0.02 (0.11)	0.88	0.13 (0.13)	0.33	0.18 (0.11)	0.10	0.16 (0.14)	0.25
FTE	0.14 (0.09)	0.11	0.21 (0.10)	*0.05*	0.25 (0.12)	*0.04*	0.15 (0.10)	0.15	0.22 (0.13)	0.09
Ed. level	0.20 (0.08)	*0.02*	0.15 (0.09)	0.12	0.33 (0.11)	*0.01*	0.15 (0.09)	0.13	0.15 (0.12)	0.21
R^2	0.25	< 0.01	0.17	0.03	0.31	< 0.01	0.34	< 0.01	0.31	< 0.01

Note: Significant *p*-values (⩽ 0.05) are reported in italic type

Table IV.
Regression of inquiry-based leadership on background characteristics

the dependent variable, given the other characteristics. The results show a statistically significant positive relationship between age and all aspects of inquiry-based leadership, except being data literate.

A one-way analysis of variance with *post hoc* comparisons between groups using the Tukey HSD test was conducted to further explore these significant relationships to age. The results show significant differences for working with an inquiry habit of mind between respondents aged 31-40 ($M = 3.25$, SD = 0.28) and respondents aged 51-60 ($M = 3.58$, SD = 0.34). In addition, communicating a vision on inquiry-based working showed significant differences between respondents aged 31-40 ($M = 2.87$, SD = 0.49) and 51-60 ($M = 3.42$, SD = 0.44). Stimulating an inquiry habit of mind showed significant differences between respondents aged 51-60 ($M = 3.53$, SD = 0.36) and 21-30 ($M = 2.71$, SD = 0.39) and respondents aged 31-40 ($M = 3.14$, SD = 0.41) and 41-50 ($M = 3.17$, SD = 0.47). Furthermore, a significant difference was found between respondents aged 21-30 ($M = 2.71$, SD = 0.39) and ⩾ 61 ($M = 3.75$, SD = 0.17). Stimulating data literacy showed significant differences between respondents aged 51-60 ($M = 3.40$, SD = 0.51) and both respondents aged 31-40 ($M = 2.81$, SD = 0.50) and 41-50 ($M = 2.92$, SD = 0.53).

The results indicate that participants in the age group 51-60 score themselves significantly higher than participants in the age group 31-40 on working with an inquiry habit of mind and on communicating a vision for inquiry-based working. For stimulating an inquiry habit of

mind, participants in the age group 51-60 score significantly higher than participants in all three younger age groups. In addition, for stimulating data literacy, participants in the age group 51-60 score themselves significantly higher than participants in the age groups 31-40 and 41-50.

Educational level has a significant positive relationship to working with an inquiry habit of mind and also to communicating a vision for inquiry-based working as part of creating a culture of inquiry. This indicates that school leaders with a master's degree score higher on these aspects than leaders with a bachelor's degree. FTE has a significant relationship to data literacy and to communicating a vision for inquiry-based working. This indicates that school leaders who work full-time score higher on being data literate and on communicating a vision for inquiry-based working. Gender and function appeared to have no significant relationship to any aspect of inquiry-based leadership, given the other predictors.

Table V shows the correlation (r) and the p-values (p) between the measured psychological factors and inquiry-based leadership. There is a strong positive correlation between all independent and all dependent variables, suggesting quite a strong relationship between the measured psychological factors and inquiry-based leadership.

There were also strong, positive relationships between attitude and experienced social pressure ($r = 0.63$, $n = 79$, $p < 0.001$), between attitude and self-efficacy regarding inquiry-based leadership ($r = 0.69$, $n = 79$, $p < 0.001$), and between experienced social pressure and self-efficacy regarding inquiry-based leadership ($r = 0.67$, $n = 79$, $p < 0.001$). This indicates that high scores on attitude, high scores on experienced social pressure, and high scores on self-efficacy regarding inquiry-based leadership are associated with each other.

Table VI shows the results of the regression analyses of the measured psychological factors on inquiry-based leadership, taking into account the significant background characteristics (age, FTE, and educational level) from the previous regression analyses. In all models, the proportion of explained variance (R^2) additionally explained by the psychological factors was significant. The regression analyses show that self-efficacy is significantly related to all aspects of inquiry-based leadership with one exception within the area of creating a culture of inquiry: stimulating the inquiry habit of mind of teachers. This means that the higher their self-efficacy, the higher school leaders score on leading their school in an inquiry-based way. Attitude is related to two aspects of creating a culture of inquiry, namely, communicating a vision on inquiry-based working and stimulating the inquiry habit of mind of teachers. This implies that leaders, who are positive regarding inquiry-based leadership, score higher on these two aspects than leaders who are less positive toward inquiry-based leadership. Experienced social pressure is not significantly related to any aspect of inquiry-based leadership, given the other predictors.

From the background characteristics, only the school leader's age appears to be significantly related to stimulating the inquiry habit of mind of teachers and stimulating data literacy, given the factors attitude, experienced social pressure, and self-efficacy regarding inquiry-based leadership. Older school leaders tended to report a greater confidence that they were stimulating the inquiry habit of mind and the data literacy of teachers than younger school leaders.

| | Working with an inquiry habit of mind | | Being data literate | | Creating a culture of inquiry by | | | | | |
| | | | | | Communicating a vision on inquiry-based working | | Stimulating the inquiry habit of mind of teachers | | Stimulating data literacy of teachers | |
	r	p	r	p	r	p	r	p	r	p
Attitude	0.57	< 0.01	0.49	< 0.01	0.67	< 0.01	0.63	< 0.01	0.59	< 0.01
Social pressure	0.45	< 0.01	0.47	< 0.01	0.55	< 0.01	0.60	< 0.01	0.60	< 0.01
Self-efficacy	0.58	< 0.01	0.59	< 0.01	0.67	< 0.01	0.61	< 0.01	0.64	< 0.01

Table V.
Correlations between psychological factors and inquiry-based leadership

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| | Working with an inquiry habit of mind | | Being data literate | | Creating a culture of inquiry | | | | | |
| | | | | | Communicating a vision on inquiry-based working | | Stimulating an inquiry habit of mind | | Stimulating data literacy | |
	b (SE)	p	b (SE)	p	b (SE)	p	b (SE)	p	b (SE)	p
Intercept	1.77 (0.28)	0.00	1.73 (0.32)	0.00	0.38 (0.35)	0.28	0.88 (0.30)	0.01	0.23 (0.38)	0.55
Age	0.05 (0.04)	0.20	0.01 (0.04)	0.81	0.07 (0.05)	0.17	0.12 (0.04)	*0.00*	0.13 (0.05)	*0.01*
FTE	0.02 (0.08)	0.78	0.12 (0.09)	0.17	0.15 (0.09)	0.12	0.08 (0.08)	0.36	0.10 (0.10)	0.32
Educational level	0.09 (0.08)	0.26	0.03 (0.09)	0.69	0.14 (0.09)	0.14	0.01 (0.08)	0.89	−0.01 (0.10)	0.96
Attitude	0.22 (0.12)	0.07	0.06 (0.13)	0.64	0.33 (0.14)	*0.03*	0.28 (0.13)	*0.03*	0.20 (0.16)	0.21
Social pressure	0.01 (0.11)	0.95	0.09 (0.13)	0.50	0.10 (0.14)	0.49	0.16 (0.12)	0.20	0.19 (0.15)	0.21
Self-efficacy	0.22 (0.11)	*0.04*	0.34 (0.12)	*0.01*	0.32 (0.13)	*0.02*	0.19 (0.11)	0.11	0.37 (0.14)	*0.01*
$R^{2,a}$	0.41	< 0.01	0.39	< 0.01	0.57	< 0.01	0.55	< 0.01	0.54	< 0.01
R^2 change[b]	0.20	< 0.01	0.23	< 0.01	0.27	< 0.01	0.24	< 0.01	0.25	< 0.01

Table VI.
Regression of inquiry-based leadership on significant background characteristics and psychological factors

Notes: [a]R^2 total amount of variance in inquiry-based leadership that can be explained by all predictors; [b]R^2 change due to inclusion of psychological factors (added to the model with predictors age, FTE, and educational level). Significant p-values ($\leqslant 0.05$) are reported in italic type

Discussion and conclusions

This study shows a positive correlation between attitude, experienced social pressure and self-efficacy on the one hand and inquiry-based leadership on the other hand. However, some predictors appear to make a unique and significant contribution to aspects of inquiry-based leadership and others do not. From a theoretical perspective, these findings narrow the two mentioned gaps in research and offer new insights in how psychological factors are related to whether and how school leaders lead their schools in an inquiry-based manner. The predictor that stands out to the greatest degree is self-efficacy. In line with earlier research that shows the impact of self-efficacy on educators in schools (Krüger and Geijsel, 2011; Geijsel *et al.*, 2009; Vanhoof *et al.*, 2014), this study hypothesized that school leaders with a high sense of self-efficacy toward inquiry-based leadership would lead their schools in a more inquiry-based way. This study, indeed, shows a significant relationship between self-efficacy and all three aspects of inquiry-based leadership. The sole (sub-)aspect for which self-efficacy regarding inquiry-based leadership has no significant unique contribution is stimulating the inquiry habit of mind of teachers.

This study also hypothesized, based on the theory of Fishbein and Ajzen (2010) and on research by Vanhoof *et al.* (2014), that school leaders with a positive attitude toward inquiry-based leadership would lead their schools in a more inquiry-based way. The findings reveal that the hypothesis is partly correct. Indeed, there is a significant and unique relationship between attitude and two sub-aspects of creating a culture of inquiry: these are communicating a vision on inquiry-based working and stimulating the inquiry habit of mind of teachers. This means that school leaders with a stronger positive attitude toward inquiry-based leadership also score more highly on communicating a vision on inquiry-based working and stimulating the inquiry habit of mind among teachers. This study shows no unique relationship (given the other predictors) between attitude and working with an inquiry habit of mind, being data literate and the third sub-aspect of creating a culture of inquiry: stimulating data literacy of teachers. The findings indicate that a positive attitude toward inquiry-based leadership differs in relation to creating a culture of inquiry and working with an inquiry habit of mind and being data literate. It seems as if the school leader's attitude does not influence his or her own behavior (working with an inquiry habit

of mind and being data literate), but it does affect the school leader's thinking about stimulating an inquiry-based culture in the school by communicating a vision and encouraging teachers' inquiry habit of mind.

This study finally hypothesized, based on Fishbein and Ajzen (2010), Schildkamp and Kuiper (2010) and Vanhoof *et al.* (2014), that the social pressure that school leaders experience to lead their schools in an inquiry-based way would be related to inquiry-based leadership. Given the other predictors, experienced social pressure appears to have no unique significant relationship to any aspect of inquiry-based leadership. However, the strong positive correlation among the three predictors and between each psychological factor and all aspects of inquiry-based leadership indicates that none of these hypotheses should be rejected. This means that self-efficacy, attitude, and experienced social pressure with regard to inquiry-based leadership are, indeed, related to all aspects of inquiry-based leadership – although some aspects have a unique significant relationship and others are related through the other predictors.

This study also investigated the role of the background characteristics of gender, age, function, FTE, and educational level. Taking into account the psychological factors, only age appears to have a significant relationship to two aspects of inquiry-based leadership: school leaders in the age group 51-60 score higher than others on stimulating the inquiry habit of mind and on stimulating data literacy among teachers. Since the results are based on the perception of school leaders themselves, this could mean that participants in the age group 51-60 either have a tendency to score their own capacities more highly than others do, or that they, indeed, do lead their schools in a more inquiry-based way than younger participants, for example, due to experience. Since other studies show differences between male and female leaders (Paustian-Underdahl *et al.*, 2014), it is somewhat unexpected that, taking into account the other background characteristics, gender is not indicated as being related to inquiry-based leadership. This study indicates that male and female school leaders do not differ to any significant degree in the extent to which they lead their schools in an inquiry-based way.

While the used literature might suggest causality of relationships between variables, it is important to emphasize that the methods used in this study were not intended to validate the causal nature of these relationships. This means caution is advised with regard to the interpretation of the findings. The findings show correlations instead of causalities.

A limitation of this study is that only a small number of the invited school boards participated with their schools. Although the amount of participants is adequate for the quantitative analyses undertaken, in future research in might be a better option to invite school leaders themselves instead of their school boards to participate in this type of research. It is also possible that school boards and school leaders who agreed to participate were already more focused on inquiry-based leadership and inquiry-based working than others. This is in line with the relative high scores with regard to inquiry-based leadership that are indicated by the descriptive results of this study. However, since this study has attempted to relate aspects of inquiry-based leadership to psychological factors, it could be regarded as an advantage that those school leaders participating in this research showed a certain degree of inquiry-based leadership.

Another limitation concerns the fact that self-reports were used (see e.g. Schwarz, 1999). Self-reports reflect school leaders' own perceptions and the common-method bias might lead to high correlations (see e.g. Batista-Foguet *et al.*, 2014).

According to Ajzen (1991, 2002b, 2011), attitude, experienced social pressure, and self-efficacy are assumed to predict behavioral intentions. On the basis of this theory, a qualitative follow-up study is in progress to reach a more grounded measure of actual inquiry-based leadership. This research tries to explore the relationship between the three

psychological factors used in this study on the one hand and intentions and actual behavior on the other hand. The use of qualitative methods in this follow-up – such as observations of school leaders' actions – and a focus on how teachers experience this type of leadership from their leaders could contribute to further understanding of the concept of inquiry-based leadership.

From a practical perspective, our findings are directly relevant not only for school boards who would like to stimulate inquiry-based leadership in their schools but also for educators of school leaders for the design of professional development initiatives. Based on the results, this study suggests that school boards and educators of school leaders who would like to stimulate inquiry-based leadership should bear in mind the strong relationship of inquiry-based leadership with all three psychological factors. The outcomes of this study indicate that the combination of a strong sense of self-efficacy regarding inquiry-based leadership, a positive attitude toward it and the experience of social pressure regarding inquiry-based leadership tend to result in school leaders leading their schools in a more inquiry-based way. School boards and educators of school leaders could pay attention to these aspects by giving positive feedback, emphasizing the added value of inquiry-based leadership, and stimulating peer-to-peer coaching with other leaders. Cooperating in small peer groups, talking about each other's capabilities, and discovering each person's strengths, in particular, could contribute to self-efficacy regarding inquiry-based leadership.

References

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

Ajzen, I. (2002a), "Constructing a TPB questionnaire: conceptual and methodological considerations", available at: http://chuang.epage.au.edu.tw/ezfiles/168/1168/attach/20/pta_41176_7688352_57138.pdf (accessed November 27, 2015).

Ajzen, I. (2002b), "Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior", *Journal of Applied Social Psychology*, Vol. 32 No. 4, pp. 665-683.

Ajzen, I. (2011), "The theory of planned behaviour: reactions and reflections", *Psychology & Health*, Vol. 26 No. 9, pp. 1113-1127.

Anderson, S., Leithwood, K. and Strauss, T. (2010), "Leading data use in schools: organizational conditions and practices at the school and district levels", *Leadership and Policy in Schools*, Vol. 9 No. 3, pp. 292-327.

Bandura, A. (1997), *Self-Efficacy: The Exercise of Control*, Worth Publishers, New York, NY.

Batista-Foguet, J.M., Revilla, M., Saris, W.E., Boyatzis, R. and Serlavós, R. (2014), "Reassessing the effect of survey characteristics on common method bias in emotional and social intelligence competencies assessment", *Structural Equation Modeling: A Multidisciplinary Journal*, Vol. 21 No. 4, pp. 596-607.

Brinia, V. (2012), "Men vs women; educational leadership in primary schools in Greece: an empirical study", *International Journal of Educational Management*, Vol. 26 No. 2, pp. 175-191.

Chaturvedi, S., Zyphur, M.J., Arvey, R.D., Avolio, B.J. and Larsson, G. (2012), "The heritability of emergent leadership: age and gender as moderating factors", *The Leadership Quarterly*, Vol. 23 No. 2, pp. 219-232.

Daly, A.J. (2012), "Data, dyads, and dynamics: exploring data use and social networks in educational improvement", *Teachers College Record*, Vol. 114 No. 11, pp. 1-38.

Earl, L. and Katz, S. (2006), *Leading Schools in a Data-Rich World: Harnessing Data for School Improvement*, Corwin Press, Thousand Oaks, CA.

Fishbein, M. and Ajzen, I. (2010), *Predicting and Changing Behavior: The Reasoned Action Approach*, Psychology Press, New York, NY.

Fisher, Y. (2014), "The timeline of self-efficacy: changes during the professional life cycle of school principals", *Journal of Educational Administration*, Vol. 52 No. 1, pp. 58-83.

Fullan, M. (2008), *The Six Secrets of Change*, Jossey-Bass, San Francisco, CA.

Geijsel, F.P., Sleegers, J.C., Stoel, R.D. and Krüger, M.L. (2009), "The effect of teacher psychological and school organizational and leadership factors on teachers' professional learning in Dutch schools", *The Elementary School Journal*, Vol. 109 No. 4, pp. 406-427.

Halverson, R., Grigg, J., Prichett, R. and Thomas, C. (2007), "The new instructional leadership: creating data-driven instructional systems in school", *Journal of School Leadership*, Vol. 17 No. 2, pp. 159-194.

Ikemoto, G.S. and Marsh, J.A. (2007), "Cutting through the 'data-driven' mantra: different conceptions of data-driven decision making", in Moss, P.A. (Ed.), *Evidence and Decision Making*, Blackwell, Malden, MA, pp. 105-131.

Jimerson, J.B. (2014), "Thinking about data: exploring the development of mental models for 'data use' among teachers and school leaders", *Studies in Educational Evaluation*, Vol. 42, pp. 5-14.

Katz, S. and Dack, L.A. (2014), "Towards a culture of inquiry for data use in schools: breaking down professional learning barriers through intentional interruption", *Studies in Educational Evaluation*, Vol. 42, pp. 35-40.

Kleinsasser, R.C. (2014), "Teacher efficacy in teaching and teacher education", *Teaching and Teacher Education*, Vol. 44, pp. 168-179.

Krüger, M.L. (2010a), "Leading schools in the knowledge society: on the way to leaders of learning in inquiry-based schools", in Normore, A.H. (Ed.), *Global Perspectives on Educational Leadership Reform*, Emerald Group Publishing Limited, Bingley, pp. 397-417.

Krüger, M.L. (2010b), "De invloed van schoolleiderschap op het onderzoeksmatig handelen van leraren in veranderingsprocessen (The impact of school leadership on the research attitude of teachers in innovation processes)", Hogeschool van Amsterdam, Amsterdam.

Krüger, M.L. and Geijsel, F.P. (2011), "The effect of school leadership on teachers' inquiry habit of mind", paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Krüger, M.L., Witziers, B. and Sleegers, P. (2007), "The impact of school leadership on school level factors: validation of a causal model", *School Effectiveness and School Improvement*, Vol. 18 No. 1, pp. 1-20.

Lachat, M.A. and Smith, S. (2005), "Practices that support data use in urban high schools", *Journal of Education for Students Placed at Risk*, Vol. 10 No. 3, pp. 333-349.

Ladd, H.F. and Fiske, E.B. (2011), "Weighted student funding in the Netherlands: a model for the US?", *Journal of Policy Analysis and Management*, Vol. 30 No. 3, pp. 470-498.

Lai, M.K. and Schildkamp, K. (2013), "Data-based decision making: an overview", in Schildkamp, K., Lai, M.K. and Earl, L. (Eds), *Data-Based Decision Making in Education: Challenges and Opportunities*, Springer Science & Business Media, Dordrecht, pp. 9-21.

Lee, M., Seashore Louis, K. and Anderson, S. (2012), "Local education authorities and student learning: the effects of policies and practices", *School Effectiveness and School Improvement*, Vol. 23 No. 2, pp. 133-158.

Levin, J.A. and Datnow, A. (2012), "The principal role in data-driven decision making: using case-study data to develop multi-mediator models of educational reform", *School Effectiveness and School Improvement*, Vol. 23 No. 2, pp. 179-201.

Mandinach, E.B. (2012), "A perfect time for data use: using data-driven decision making to inform practice", *Educational Psychologist*, Vol. 47 No. 2, pp. 71-85.

Mandinach, E.B. and Gummer, E.S. (2013), "A systemic view of implementing data literacy in educator preparation", *Educational Researcher*, Vol. 42 No. 1, pp. 30-37.

Ministerie van Onderwijs, Cultuur en Wetenschap (2013), "Kerncijfers 2008-2012. Onderwijs, Cultuur en Wetenschap (Key figures 2008-2012. Education, culture and science)", Ministerie van OCW, Den Haag.

Organisation for Economic Co-operation and Development (2013), *Synergies for Better Learning: An International Perspective on Evaluation and Assessment, OECD Reviews of Evaluation and Assessment in Education*, OECD Publishing, Paris.

Paustian-Underdahl, S.C., Walker, L.S. and Woehr, D.J. (2014), "Gender and perceptions of leadership effectiveness: a meta-analysis of contextual moderators", *Journal of Applied Psychology*, Vol. 99 No. 6, pp. 1129-1145.

Sanbonmatsu, D.M. and Fazio, R.H. (1990), "The role of attitudes in memory-based decision making", *Journal of Personality and Social Psychology*, Vol. 59 No. 4, pp. 614-622.

Scheerens, J. (2016), *Educational Effectiveness and Ineffectiveness: A Critical Review of the Knowledge Base*, Springer Science & Business Media, Dordrecht.

Schildkamp, K. and Kuiper, W. (2010), "Data-informed curriculum reform: which data, what purposes, and promoting and hindering factors", *Teaching and Teacher Education*, Vol. 26 No. 3, pp. 482-496.

Schildkamp, K., Ehren, M. and Lai, M.K. (2012), "Editorial article for the special issue on data-based decision making around the world: from policy to practice to results", *School Effectiveness and School Improvement*, Vol. 23 No. 2, pp. 123-131.

Schildkamp, K., Karbautzki, L. and Vanhoof, J. (2014), "Exploring data use practices around Europe: identifying enablers and barriers", *Studies in Educational Evaluation*, Vol. 42, pp. 15-24.

Schildkamp, K., Rekers-Mombarg, L.T. and Harms, T.J. (2012), "Student group differences in examination results and utilization for policy and school development", *School Effectiveness and School Improvement*, Vol. 23 No. 2, pp. 229-255.

Schwarz, N. (1999), "Self-reports: how the questions shape the answers", *American Psychologist*, Vol. 54 No. 2, pp. 93-105.

Van der Rijst, R.M., Kijne, J.W., Verloop, N. and Van Driel, J.H. (2008), "Exploring scientific research disposition from the perspective of academics", paper presented at the National Association of Research in Science Teaching, Baltimore, MD.

Vanhoof, J., Vanlommel, K., Thijs, S. and Vanderlocht, H. (2014), "Data use by Flemish school principals: impact of attitude, self-efficacy and external expectations", *Educational Studies*, Vol. 40 No. 1, pp. 48-62.

Visser-Wijnveen, G.J., Stes, A. and Van Petegem, P. (2012), "Development and validation of a questionnaire measuring teachers' motivations for teaching in higher education", *Higher Education*, Vol. 64 No. 3, pp. 421-436.

Wayman, J.C., Brewer, C. and Stringfield, S. (2009), "Leadership for effective data use", paper presented at the Annual Meeting of the American Educational Research Association, San Diego, CA.

Wayman, J.C., Jimerson, J.B. and Cho, V. (2012), "Organizational considerations in establishing the data-informed district", *School Effectiveness and School Improvement*, Vol. 23 No. 2, pp. 159-178.

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1. Lisette Uiterwijk-Luijk, Meta Krüger, Monique Volman. 2017. Promoting inquiry-based working. *Educational Management Administration & Leadership* **2**, 174114321773935. [Crossref]