Data-based decision making in primary education: An exploratory case study

Keywords: Data team method, primary education

Author: W.B. (Wilma) Kippers
S1199277
Component: Master thesis
Faculty of Behavioral Sciences
Department of Educational Science and Technology
University of Twente: Project ‘Data teams‘
Graduation Committee: First supervisor: K. Schildkamp
Second supervisor: M.D. Hubers
Date: Enschede, August 2014

dateteams

UNIVERSITEIT TWENTE.

Table of contents

Preface

This thesis was written under the supervision of the University of Twente and concluded my master program in Educational Science and Technology. It describes the perception of school leaders, data experts and teachers whether the data team method can be used in primary education and the school organizational characteristics for working with the method in primary education. During the final stages of my master program, I received great support from several people. This preface will be used to thank them.

First, my deepest thanks go to Ms. Schildkamp, my first supervisor, for her great guidance and feedback. Her enthusiasm and optimism stimulated me in writing this master thesis. She also took part in the workshop for the second primary school as a trainer, which deepened the knowledge and skills of the participants.

Second, I would like to thank Ms. Hubers, my second supervisor, for her time spent on my thesis and the moments of feedback, which made it possible to enrich this research.

Third, I give special thanks to Mr. Gelderblom, who took part in the workshops for the three primary schools as a trainer. His knowledge and skills about data-based decision making and primary schools ensured that he could train the school teams during the workshops about the data team method. The communication between him and me was always pleasant, and I appreciate his openness.

At last, I would like to thank my parents, my sisters and brother, my boyfriend, and my friends. They encouraged me to further educate myself and enroll in this program. They supported me in all possible ways in giving time to complete my research. I will always be grateful for this.

Wilma Kippers
Enschede, August 2014

Summary

Teachers and school leaders make a lot of decisions about the education they provide, which influences the effectiveness of the education at their school. Schools can improve their effectiveness by making data-based decisions. This means that school leaders and teachers analyze data and base their decisions on data. Data can be used to provide evidence for the effectiveness of their education, because data show whether student learning needs are addressed and teaching should be adapted.

In order to support schools in secondary education with the use of data for decision making, the data team method was developed. A data team consists of five to eight teachers and school leaders that use the data team method to try to solve an educational problem within the school. This can lead to educational improvement and professional development.

This present study describes an exploratory case study. The perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education are studied. In addition, the school organizational characteristics for working with the data team method in primary education are studied. Therefore, workshops were given to three primary schools by a trainer of the University of Twente. By giving workshops, the data team method was explored in the primary schools and the school organizational characteristics of the primary schools were studied by using observations, focus-group interviews, and individual interviews as data collection.

The results of this study are positive towards the use of the data team method in primary education. According to the respondents, the method was found comprehensible, useful and added valued to be used in the primary schools. However, it is important that trainers guide data team members in depth in formulating a concrete and measurable hypothesis (step 2), in understanding and applying the concepts reliability and validity to check the quality of data (step 4), and in analyzing data (step 5). Time given by trainers and school leaders to data team members is also essential. When starting with a pilot of primary schools next school year, it is important that the role of the school leader, the data expert and the coordinator in data teams in primary education will be studied in depth, because their role might be different compared to their role in data teams in secondary education. The results of this study showed that the school leader might not need to participate in data teams in primary education, but should facilitate and discuss the progress of the data team. Data experts and coordinators might have an important role in guiding and teaching data teams next to the guidance of trainers. The results about the school organizational characteristics ‘school culture’, ‘innovation attitude’ and ‘prioritizations’ are consistent with using the data team method in secondary education.

This research might be of use to primary schools, which would like to start with a data team, as it will provide them with insight into the important characteristics for working with the method. Further research should explore, for example, the different functions of the school leaders, data experts, and teachers in a data team in primary education. In addition, the collaboration between data team members during the trajectory of the method in primary education can be studied. Furthermore, the professional development of data team members when using the data team method in primary education can be explored.

1. Introduction

Teachers and school leaders make a lot of decisions about the education they provide that impacts student learning. It is important that school leaders and teachers make informed decisions, because these decisions influence the effectiveness of the education at their school. School leaders and teachers should use data in making these decisions, because data enables them to adapt their teaching to address student learning needs (Schildkamp & Lai, 2013).

According to Carlson, Borman and Robinson (2011), schools can improve their effectiveness by data-based decision making, hereafter called data use. This means that school leaders and teachers analyze data and base their decisions on these data. When they use data, this can lead to improvement in student achievement and professional development of school leaders and teachers, because school leaders and teachers can continually monitor the impact of their practices on student learning and monitor if goals are being reached and problems are being solved (Earl & Katz, 2006; Ledoux, Blok, Boogaard, & Krüger, 2009; McNaughton, Lai, & Hsiao, 2012; Schildkamp & Lai, 2013; Timperley, Wilson, Barrar, & Fung, 2007).

However, teachers and school leaders often do not use data for decision making (Schildkamp & Lai, 2013). 40 percent of the decisions of teachers are based on their beliefs, experiences or intuition (Ingram, Louis, & Schroeder, 2004). Moreover, several teachers and school leaders do not have the skills to use and analyze data (Ikemoto & Marsh, 2007; Inspectie van het Onderwijs, 2013; Marsh, Pane, & Hamilton, 2006; Murray, 2013; Schildkamp & Kuiper, 2010). Therefore, school leaders and teachers need support in the use of data for decision making.

Because of this lack of data use in education, Schildkamp and Handelzalts (2011) developed a method in order to support schools in secondary education with the use of data: the data team method. Several studies have shown that the use of the data team method in secondary education can lead to educational improvement and professional development (Schildkamp & Ehren, 2012; Schildkamp & Handelzalts, 2011; Schildkamp, Poortman, & Handelzalts, 2013a).

So far, this method has only been implemented in secondary education, which differs in organization from primary education (Verloop, 2003). Teachers in secondary education mainly use data about their own teaching subject and they teach a lot of different groups of children during the school year, for example, differences in age. In addition, the school timetable of teachers in secondary education differs every school day and secondary schools are often located outside the residential area. Also, teachers in secondary education often give students homework. However, teachers in primary education use data about different kind of teaching subjects, because they teach different subjects, and they mainly teach one group of children during the school year. In addition, the school timetable of teachers in primary education is mainly equal every school day and primary schools are often located in the residential area. Also, teachers in primary education give students only sometimes homework.

Because primary education and secondary education differ in organization, they also differ in school organizational characteristics. For example, secondary schools are often large schools compared to primary schools. In addition, the functions in the schools might be different, because next to school leaders and teachers,

there are, for example, team leaders in secondary education and coordinators in primary education. It is essential to study the school organizational characteristics of primary education, because they might influence the use of data in primary schools, and whether the method can be used in primary education. *Leadership*, *school culture*, *innovation attitude*, and *data expert* are essential school organizational characteristics for primary education (Datnow, Park, & Kennedy-Lewis, 2013; Ingram et al., 2004; Murray, 2013; Schildkamp, Ehren, & Lai, 2012a; Schildkamp & Poortman, 2013). These school organizational characteristics will be explained more in depth in the theoretical framework.

Furthermore, it is essential to study whether the data team method can be used in primary education so the quality of the method can be evaluated and therefore, three criteria are important in this study. The perception of school leaders, data experts and teachers about whether the method is *comprehensible*, such as studying the questions asked by respondents about vocabulary related to the data team method. Furthermore, the perception of school leaders, data experts and teachers about whether the method is *useful*, such as studying the participants when working on the eight steps in the workshop. In addition, the perception of school leaders, data experts and teachers about whether the method has an *added value*, such as studying advantages of the method for using data described by participants of the workshop. These criteria will be explained more in depth in the theoretical framework.

Studying the criteria for using the data team method in primary education, and the school organizational characteristics for working with the data team method in primary education, leads to two questions:

1. What is the perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education?
2. Which school organizational characteristics are important for working with the data team method in primary education?

2. Theoretical framework

2.1 Data-based decision making

The definition of data in the context of schools is: 'Information that is collected and organized to represent some aspects of schools' (Lai & Schildkamp, 2013, p.10). In primary schools, the word 'information' can be interpreted in a broad sense. Not only assessments, such as mathematic tests of pupils in 5th Grade, but also observations, such as observations of teachers teaching in 3rd Grade, and questionnaires, such as questionnaires for parents about a new timetable, can be used for collecting data (Murray, 2013; Wayman, Jimerson, & Cho, 2012).

Ikemoto and Marsh (2007) identify four types of data: context data, input data, process data and outcome data. Context data are data about the policy of the school and finances. For example, the school provides resources to develop new writing materials. Input data are data about the characteristics of teachers and pupils. For instance, which certificates teachers in primary education have. Process data are data about instructions and assessments. For instance, the instruction time of one mathematics lesson in the 8th Grade in a primary school. Finally, outcome data are data about pupil achievement or pupil's well-being in primary schools. For example, the results of pupils in primary education on a survey about how they feel in the classroom with other pupils.

The definition of data-based decision making, which will be used in this study, is: 'Schools make decisions about students, about instruction, and about school and system functioning based on a broad range of evidence, such as scores on students' assessments and observations of classroom teaching' (Schildkamp & Lai, 2013, p.1). This specific definition is chosen, because this in-depth description of data-based decision making is consistent with how primary schools will learn to make data-based decisions by using the data team method in order to improve education in schools and develop professionalism of school leaders, data experts, and teachers.

2.2 The data team method

The data team procedure of the data team method (developed based on Earl & Katz, 2006), consists of eight steps (see also Figure 1 and the box below) (Schildkamp & Ehren, 2012, p. 56-57; Schildkamp & Handelzalts, 2011; Schildkamp et al., 2013a):

The Eight steps of the data team procedure

1. Problem definition: the team decides on which educational problem and goals they want to focus their efforts. For example, if the data team decides to focus on grade retention, the first thing the team has to do in this step is collect data on grade retention (e.g. how many grade repeaters does the school have in each grade).
2. Formulating hypotheses: the team develops hypotheses (for example on what causes grade retention).
3. Data collection: the team collects data to either confirm or reject the hypotheses. Several types of data can be collected (e.g. assessment data, inspection reports, and examination results).
4. Data quality check. Are the collected data valid and reliable?
5. Data analysis (e.g. summarizing, calculating, comparing). This can involve simple data analyses (e.g. descriptive analyses, summarizing interview data) as well as more sophisticated analyses (e.g. correlational and regression analyses). For example, a data team in one of the studies (Schildkamp & Handelzalts, 2011) had the hypothesis that the policy of the school to still promote students with five insufficient marks on their report card to the next grade caused grade retention in the following grade. The data team collected report card data and retention data and found out that students who were promoted with five insufficient marks on their report card did not have to repeat the following grade. The hypotheses turned out to be false.
6. Interpretation and conclusion: If hypotheses turn out to be false, new hypotheses need be investigated. The data team needs to collect additional data (back to step 2). If hypotheses are correct, the team draws conclusions based on the collected data.
7. Implementing improvement measures. The team describes the measures needed to solve the problem, and the goals that go with these measures. The team makes team members responsible for implementing the actions, and determines which resources are available for implementing the actions. The team also thinks of ways to monitor the implementation of the actions, sets deadlines, and determines which data are needed to establish the effectiveness of the implemented actions.
8. Evaluation. Are the actions effective? Are the goals met? Are the problems solved and is the team satisfied? To evaluate the actions, new data needs to be collected. This process continues until the priorities are met and the goals are reached. Then the team can go back to step 1 to work on a new problem and goals.

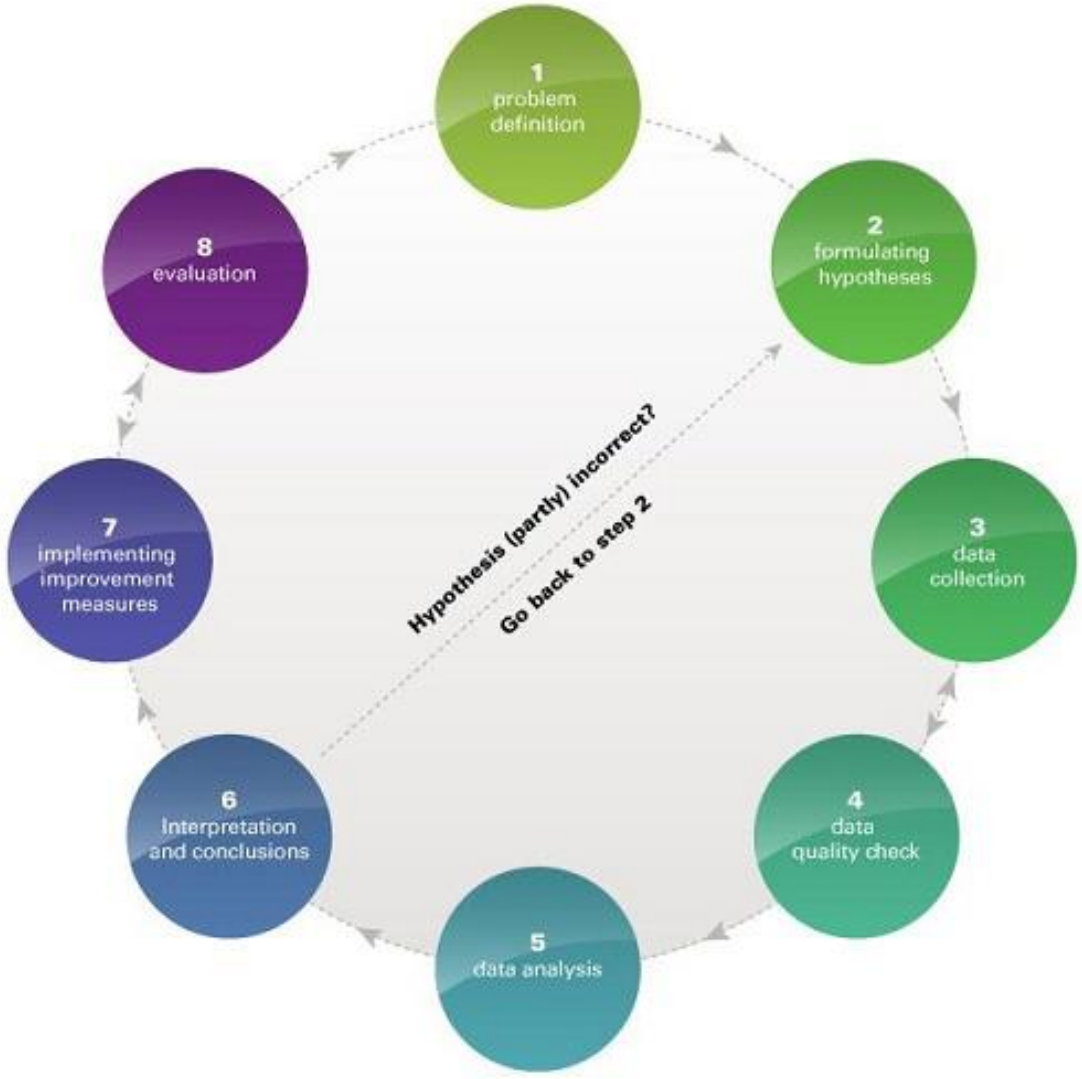

Figure 1. *The data team procedure*. Schildkamp & Ehren, 2012, p. 56-57.

Data teams consist of four to six teachers and one to two school leaders. They collaborate with each other and use the data team procedure to solve the educational problem in their school (Schildkamp & Handelzalts, 2011; Schildkamp & Poortman, 2013). Data teams are trained by a trainer from the University of Twente. In secondary education, the trainer meets the school every two to three weeks over a period of two years. In every meeting, the data team and the trainer work on the eight steps of the data team procedure (Schildkamp & Poortman, 2013). For example, in a meeting, the focus is on step two of the procedure in which possible hypotheses about the cause of the problem in the school are being discussed with the use of a worksheet and a final, concrete and measurable hypothesis is formulated.

It is important that school leaders and teachers collaborate in this training, because they are more apt to implement changes in practice when they collaborate. Schildkamp and Handelzalts (2011) also state that collaboration in the data team helps teachers and school leaders to learn from each other. For example, when one teacher has an idea about which data should be used to solve the problem about the number of pupils leaving the school, another teacher can supplement ideas about other relevant hypotheses.

According to the results of several studies, the work of data teams in secondary education is essential in improving education and developing professionalism (Schildkamp & Ehren, 2012; Schildkamp & Handelzalts,

2011; Schildkamp et al., 2013a). The study of data teams in secondary education showed that the data teams did solve problems within the school which is positive for improving education. Furthermore, the members in the data team learn how to use data for solving problems and reaching goals which is positive for professional development of school leaders and teachers (Schildkamp & Handelzalts, 2011; Schildkamp et al., 2013).

When studying the perception of school leaders, data experts, and teachers about the use of the data team method in primary education, three criteria are important to guarantee the quality of the data team method (Van der Meij & Carroll, 1998).

First, the data team method should be *comprehensible*. The content of the method should be easy to understand by school leaders, data experts, and teachers. In this study, their understanding is explored by asking respondents to give a description of the method, because in this way, it can be controlled whether they are able to reproduce important content of the method. This can provide information about the comprehensibility of the method by school teams in primary education. In addition, the used vocabulary should be in line with the vocabulary used in primary education. Studying the questions asked by participants of the workshop about the vocabulary related to the data team method provide essential information.

Second, the data team method should be *useful*. The eight steps of the data team procedure should work in practice. In this study, the usefulness is explored by observing the participants in working on the eight steps in a workshop. Furthermore, studying the questions asked by participants about the eight steps of the data team method also provides essential information. In addition, the opinions of the school leaders, data experts, and teachers about the usefulness of the method are asked which provides important information.

Third, the data team method should have an *added value*. The method has an added value when advantages of the method for using data are described by teachers, data experts, and school leaders in primary education. Studying the added values described by participants of the workshop provides important information. Examples of possible added values of the method are the development of knowledge and skills to use data, and a less use of intuition when using the data team method.

2.3 School organizational factors

Data use can be influenced by different factors. Primary education and secondary education are different school organizations (Verloop, 2003). Therefore, it is crucial to study which organizational characteristics influence the use of data in primary education. *Leadership, school culture, innovation attitude*, and *data expert* are essential organizational characteristics for primary education (Datnow, Park, & Kennedy-Lewis, 2013; Ingram et al., 2004; Schildkamp, Ehren, & Lai, 2012a; Schildkamp & Poortman, 2013). These factors will be described as separate factors, but these factors are related to each other, even overlap to some extent, and influence each other. The consequence of this is that when influencing one factor, other factors will be influenced as well. For example, the school culture is related to innovation attitude and to the school leader. By influencing the school culture as one factor, the innovation attitude of teachers and the support of the school leader will also be influenced. The factors will be explained in the following of this paragraph. All these school organizational factors are related to the use of data in primary education and are also related to the whether the data team method can be used in primary education.

2.3.1 Leadership

School leadership is important to support data use in the school (Cohen-Vogel & Harrison, 2013; Datnow & Hubbard, 2014; Datnow et al., 2013; Schildkamp et al., 2012a; Moolenaar, Daly, & Sleegers, 2010; Schildkamp & Poortman, 2013; Schildkamp, Rekers-Mombarg, & Harms, 2012b; Wayman, Jimerson, & Cho, 2012). Because school leaders have an important role in data teams in secondary education, it is essential to study the role of school leaders in data teams in primary education.

First, research of data teams in secondary education showed that the school leader must be *part of the data team*, because they have different perspectives on data use than teachers (Schildkamp et al., 2013a). For example, the management of the school, including the school leader, focuses more on the performance of teachers themselves while teachers focus more on the students and the school-level factors than on themselves. The participation of the school leader in the data team can influence whether the data team method can be used in primary education.

Second, the school leader should involve teachers in *formulating goals* which meet the needs of the school (Levin & Datnow, 2012). Shared vision and goals in the data team is essential for effective use of the data method, because in step 1, a problem should be chosen on which the data team should focus during the whole data team procedure. This problem should be shared by the whole school team to stimulate the commitment to use the method to reach the desired goals of the school (Earl & Katz, 2006; Murray, 2013; Schildkamp & Poortman, 2013; Wayman et al., 2012). For example, a shared vision of the data team that using data will lead to educational improvement and a shared goal of the data team to reduce the number of repeaters in the 5th Grade. For the use of the data team method in primary education, this means that the school leader should formulate goals together with teachers at the start of the first step of the data team method.

Third, the school leader should focus on *distributed leadership* for data use (Algozzine, Friend, McRae, & Seifert; 2011; Supovitz & Tognatta, 2013). The school leader should give teachers and data experts the autonomy to make certain decisions based on data, because this will increase the motivation of the whole school team to use data. Datnow et al. (2013) mention that the school leader need to ensure that teachers and data experts have the flexibility to actually make decisions about classroom instruction based on data. When using the data team method in primary education, the school leaders, data experts, and teachers should all make certain decisions based on collected data, because this leads to the engagement of all school team members and an increase in the commitment to the method.

Fourth, the school leader should structure *time* in the use of data to support the data team, because time is needed for the data team to go through the eight steps of the method during the school year (Datnow & Hubbard, 2014; Datnow et al., 2013; Levin & Datnow, 2012; McCann & Cohen Kabaker, 2013). The school leader must organize meetings and give time for collaboration between teachers, data experts, and school leaders. Teachers should feel they have the time to discuss and collaborate with each other and have the time to engage in the reform (Marsh et al., 2006; Van Veen & Sleegers, 2006). This means, that the school leader should structure time in using the data team method in primary education during the school year.

Fifth, the school leader should have *data literacy*, because the results of the school should be controlled by analyzing data in depth, and the school leader should also be able to analyze data when taking part in the data

team (Datnow & Hubbard, 2014). According to Earl and Katz (2006), a school leader with data literacy should be able to think about the goals of using data, should check the quality of data, should have knowledge about how to analyze data, should have knowledge about how to interpret data and should pay attention to report the outcomes. However, some school leaders have a lack of data literacy. They feel insecure about their role in leading data use in the school (Levin & Datnow, 2012; Murray, 2013). Whether the school leader has data literacy can influence whether the data team method can be used in primary education.

Sixth, the school leader should be a *model* for teachers and data experts in using data, so that teachers and data experts can first observe what is expected of them and feel more comfortable in engaging in this new method. Modeling might lead to an increase in the ability of teachers and data experts to analyze data (Levin & Datnow, 2012; Schildkamp et al., 2012b).The school leader should actively use data in the school (Marsh et al., 2006) and support teachers and data experts in the use of data by indicating how important data use is and by being enthusiastic about data use (Datnow et al., 2013; Schildkamp & Poortman, 2013). For the use of the data team method in primary education, this means that the school leader should model the use of the data team method and support teachers and data experts in using this.

Seventh, the school leader should *teach* teachers and data experts how to use data, because when the whole school team is able to use data and are able to go through the eight steps during the school year, the sustainability of the method in the school will be enlarged for the following school years (Levin & Datnow, 2012). The school leader should teach teachers how to use, for example, observations of their teaching to identify instructional strategies. However, many school leaders have not had adequate training in analyzing and interpreting data and they have difficulties to teach teachers and data experts how to use data (Datnow et al., 2013). Whether the school leader teaches data experts and teachers how to use the data team method can influence the use of the data team method in primary education.

2.3.2 School culture

In addition to the school leader, a school culture is also an important school organizational factor (Datnow et al., 2013; Schildkamp et al., 2012b). It is essential to study the school culture of primary schools in this study, because a school culture characterizes the identity of schools which can influence the use of the data team method in primary education. Four aspects are essential to contribute to a school culture in which school leaders, data experts and teachers use the data team method.

First, *data use* in the school team is essential. The definition of a school team who focus on data use, which will be used in this study, is: 'The way in which school leaders, data experts, and teachers take great care to promote thoughtful use of data, to promote a positive and collective orientation toward data use, and to provide tools that would help teachers meet the intended goals of data use' (Datnow et al., 2013, p. 357). It is important to study whether the primary schools in this study focus on data use, because it determines how teachers use data and which types of data are used. Furthermore, data use influences the way in which decisions based on data are made (Ingram et al., 2004).

Second, *collaboration* between teachers, data experts and school leaders is important (Datnow & Hubbard, 2014; Datnow et al., 2013; Ikemoto & Marsh, 2007; Levin & Datnow, 2012; Schildkamp et al., 2012b). It is

essential to study the collaboration in the data teams, because by collaborating, the teacher capacity and the team effort can be increased by together analyzing causes of problems based on data and solve these problems. Whether teachers, data experts and school leaders collaborate, might influence the use of the data team method in primary education.

Third, *trust* between school leaders, data experts and teachers is important to study, because with trust in a school team, data can be discussed in an open way, and the whole data team relies on each other (Algozzine et al., 2011; Datnow et al., 2013). Thereby, the data team will feel comfortable in coming to meetings to share data. In addition, the whole school team is interdependent, because, for example, the conclusions of the data team should be translated into concrete actions whereby there is a possibility that all school leaders, data experts, and teachers in the whole school should be involved. So, when using the data team method in primary education, teachers, data experts, and school leaders should trust each other.

Fourth, explicit *expectations and norms* regarding data use throughout the school are important (Cohen-Vogel & Harrison, 2013; Datnow & Hubbard, 2014; Datnow et al., 2013). It is essential to study whether expectations and norms regarding data use are expressed in primary schools, because when the school team is accustomed to use data in the school because using data in the school is already a norm, teachers are less likely to return to old routines of making decisions based on intuition which promotes the use of the data team method in the school. In addition, setting high expectations, such as norms for the conversations in the meeting and what materials teachers are expected to bring to meetings, will lead to professional accountability among the teachers. For the use of the data team method in primary education, this means that in the school, there should be set expectations and norms regarding data use.

2.3.3 Innovation attitude

Next to the school leader and school culture, an innovation attitude is also an important school organizational factor. The definition of innovation attitude in the context of primary schools, which will be used in this study, is: 'The extent to which teachers have a positive attitude towards developing new knowledge, generating new practices and trying new ideas' (Moolenaar et al., 2010, p. 638). In this study, it is essential to study the innovation attitude in primary schools, because the attitude of teachers towards the data team method influences the way training or support is received which influences the use of the method in primary education (Moolenaar et al., 2010). According to Marsh et al. (2006), a positive attitude towards data use is beneficial for the way training will be received. Three aspects are important in considering how school leaders, data experts and teachers experience training about data use (Marsh et al., 2006).

First, whether or not school leaders, data experts, and teachers feel an *obligation* to use data should be studied, because it can have an impact on how training about the data team method will be received (Schildkamp & Poortman, 2013). Educational changes in the school can only be reached when teachers feel they have the voluntariness to participate in training about data use and not by providing a mandatory training (Terhart, 2013). Whether school leaders, data experts, and teachers voluntary use data can have influence on the use of the data team method in primary education.

Second, the *willingness* of school leader, data experts and teachers to use data is very important to study, because these findings indicate whether they are willing to use the data team method in primary schools. Teacher resistance is an everlasting phenomenon which all school reforms in the past have had to deal with and some teachers are also resistant to data use. For example, when teachers believe that there is no need to change their own practices because others are responsible (Datnow & Hubbard, 2014; Van Veen & Sleegers, 2006). When using the data team method in primary education, school leaders, data experts, and teachers should be willing to use the method.

Third, *emotions* of school leaders, data experts and teachers are involved in the interaction between them and the data team method (Van Veen, Sleegers, & Van de Ven; 2005). In this study, it is essential to study the emotions of teachers, data experts, and school leaders, because their emotions show whether they appreciate data use, which might influence the use of the data team method in their primary school, because in the data team method, analyzing data in depth is the most important characteristic. Negative emotions are, for example, anger and shame, and positive emotions are, for example, enthusiasm and happiness. For the use of the data team method in primary education, this means that school leaders, data experts, and teachers should show positive emotions and appreciate data use. However, showing negative emotions, such as insecurity, might also be beneficial for the use of the method in primary education, because by feeling insecure, they might understand that they can influence student results, for example, by changing their instruction, instead of believing that others are responsible.

2.3.4 Data expert

In addition to the school leader, school culture and innovation attitude, the data expert is also an important school organizational factor. In this study, it is essential to study the data expert, because the data expert has an important role in using data in primary schools which can influence the use of the data team method in primary education. For example, in many primary schools, the data expert is responsible for pupil care, coaching the teachers, giving shape to the vision of the schools about education and focusing on the pedagogical and didactic approach within the school. The data expert tries to answer questions by analyzing data (Bokhorst, 2002; Pameijer & Van Beukering, 2006). Examples of questions are: How well are the results of my group of students compared to a norm group in the Netherlands? How well are the results of this group compared to other groups in the school or the same group in other years? The development and training of the capacity of the school team in using data is essential in establishing effective data use in schools (Algozzine et al., 2011; Cohen-Vogel & Harrison, 2013; Murray, 2013). Training can be facilitated through internal support, for example by the data expert of the school itself. However, training the school team in using data is often difficult for data experts, because not only knowledge and skills to use data are needed, but also knowledge and skills to guide the school team. These knowledge and skills can be developed by participating in a data team and by learning from the trainers. The participation of the data expert in the data team and whether the data expert is able to train teachers and school leaders in using data can influence the use of the data team method in primary education.

3. Method

3.1 Research description

An embedded, multiple-case study design of three cases was used to contribute to theories about teachers, data experts, and school leaders of primary schools in the use of data (Miles, Huberman, & Saldaña, 2013; Swanborn, 2013; Yin, 2003). This case study enabled the use of different instruments and respondents, and the data provided details and thick descriptions which generated deeper insights (Dooley, 2001; Swanborn, 2013).This case study was exploratory and qualitative. It was used to explore and gain deeper insights in which school organizational characteristics are important for working with the data team method in primary education, and the comprehensibility, usefulness and added value of the data team method for the use in primary education (Miles et al., 2013; Yin, 2003).

In studying the use of the data team method and the school organizational characteristics in primary schools, workshops were given to the three primary schools by trainers of the University of Twente. In this workshop, it was possible to observe the comprehensibility and the usefulness of the method. Also, aspects of the school organizational characteristics leadership, data expert, school culture, and innovation attitude were possible to observe. How these aspects are observed is explained in chapter 3.3.1 and the observation scheme can be found in the appendices. The use of a workshop for this study is relevant, because by observing how school leaders, data experts, and teachers work on assignments about the eight steps, the use of the data team method in primary education can be studied. The information found is useful for studies about data-based decision making in primary education, and for primary schools that would like to use the method in the future. The workshop took two hours and was given to one primary school at a time. A PowerPoint-presentation was developed and in every workshop, the trainer introduced the workshop by providing information about data-based decision making and about the data team method. Furthermore, it was explained that a case of a fictitious primary school would be used to teach the participants how to use the data team method.

In the three primary schools, step 1 of the method (problem definition) was explained and a definite problem definition was already given by the trainers. Also, step 2 (formulating hypotheses) was explained. The participants were divided in small groups and got an assignment in which they should brainstorm about possible hypotheses. After brainstorming, one hypothesis should be chosen and formulated concrete and measurable. A moment of feedback took place after working on this assignment. The workshop proceeded with a hypothesis which was already formulated by the trainers in order to guarantee that the workshop could be continued and step 3 (data collection) was explained by showing data to the participants. Steps 4, 5 and 6 (data quality check, data analysis, interpretation and conclusion) were also explained, but thereafter, the participants were again divided in the same small groups, and got the assignment to check the quality of the data, analyze the data, and conclude whether the hypothesis is correct. A moment of feedback took place after working on this assignment. At the end, steps 7 and 8 (implementing improvement measures, evaluation) were explained. After the workshop, the participants were interviewed with regard to their view on the data team method, and the organizational conditions that are important for implementing the method.

3.2 Respondents

By using a self-built network of schools in the Netherlands, three primary schools were selected through 'convenience sampling', because of the pragmatic reason that in this first study about the data team method in primary education, the schools only had to be selected based on the stage of education (Creswell, 2009; Miles et al., 2013; Onwuegbuzie & Leech, 2007; Swanborn, 2013). The respondents of the workshop also took part in focus-group interviews, see table 1 and 2. This will be explained more in depth in paragraph 3.3.

Homogenous sampling was used to select the respondents for the individual interviews (Miles et al., 2013; Onwuegbuzie & Leech, 2007). From the workshop participants, one school leader, one data expert, one teacher who teaches in the lower years and one teacher who teaches in the upper years were selected for the individual interviews and therefore, they had to participate in the workshops next to other school leaders and teachers, see table 3. This selection is based on the theoretical framework and the characteristics of the respondents, because they are all part of the school team in primary schools and are all involved in a data team when using the data team method.

Table 1.

Number of Respondents in Workshop.

Respondents		Case A	Case B	Case C
Workshop members	School leader	1	2	3
	Data expert	1	2	2
	Teacher lower years	3	6	2
	Teacher upper years	3	6	2
	School board	1	0	0
Total		9	16	9

Table 2.

Number of Respondents in Focus-group Interview.

Respondents		Case A	Case B	Case C
Focus-group interview	School leader	1	2	3
	Data expert	1	2	2
	Teacher lower years	3	6	2
	Teacher upper years	3	6	2
	School board	1	0	0
Total		9	16	9

Table 3.

Number of Respondents in Individual Interview.

Respondents		Case A	Case B	Case C
Individual interview	School leader	1	1	1
	Data expert	1	1	1
	Teacher lower years	1	1	1
	Teacher upper years	1	1	1
Total		4	4	4

3.2.1 Case A

The first participating school (A) is a small primary school with approximately 70 children. The school is located in a village and has four classrooms to teach. The school uses combinations of Grades to teach, namely Grades 1/2, Grades 3/4, Grades 5/6, Grades 7/8. The school has a total of eight teachers, including the school leader and data expert, because they also teach children next to their own function.

3.2.2 Case B

The second participating school (B) is an average primary school with approximately 240 children. The school is located in a city and has eight classrooms to teach, namely for Grade 1 until Grade 8. The school has two school leaders, two data-experts and twelve teachers.

3.2.3 Case C

The third participating school (C) is a large primary school with approximately 520 children. The school is located in a city and has nineteen classrooms to teach, for Grade 1 until Grade 8. The school has three school leaders, two data-experts, and twenty-six teachers.

3.3 Data collection and instrumentation

3.3.1 Observations

The reactions of the workshop participants on the data team method were observed (Kallenberg, Koster, Onstenk, & Scheepsma, 2011). The observations took two hours. Data were collected by video recording the workshops and using an observation scheme. With regard to the first research question, for example, it was observed whether questions were asked by participants about vocabulary related to the data team method, and whether the participants worked on the assignment of step two of the data team procedure. With respect to the second research question, for example, it was observed whether the school leader and data-expert were present at the workshop and what the collaboration between the participants looked like when working on the assignment of step two of the data team procedure.

3.3.2 Focus-group interviews

After the workshop, interviews were conducted. In this study, focus-group interviews and individual interviews were used (Baarda, De Goede, & Van der Meer-Middelburg, 2007; Dooley, 2001; Kallenberg et al., 2011). The focus-group consisted of all the teachers, data experts and school leaders in each primary school who participated in the workshop (Owuegbuzie & Leech, 2007; Krueger, 2000). The focus-group interviews took place immediately after the workshop and were video-recorded. Relating to the first research question, for example, it was asked: 'what do you think of the used vocabulary in the method?' and 'what is your opinion about the usefulness of the steps of the data team procedure?' With regard to the second research question, for example, it was asked: 'what needs the school to use the data team method successfully?' and 'what factors hinder working with the data team method in primary education?'

3.3.3 Individual interviews

The individual interviews were taken with one school leader, one data expert, one teacher who teaches the lower years and one teacher who teaches the upper years in each primary school and were audio-recorded (Creswell, 2009). With respect to the first research question, for example, it was asked: 'what is your opinion about the used vocabulary in the data team method?' and 'can you explain whether you see an added value of the data team method?' With regard to the second research question, for example, it was asked: 'how did you experience the role of the school leader in the workshop?' and 'can you explain whether your school uses data for making decisions?' In table 4, an overview is given of the instruments, respondents and codes used to answer the research questions.

Table 4.

Relation between Research questions, Instruments and Respondents.

Research questions	Instruments	Respondents	Example codes
What is the perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education?	Focus-group interviews	All the participating school leaders and teachers of the different primary schools.	Opinion Presence data expert
	Individual interviews	School leader Data expert Teacher lower years Teacher upper years	Hinder Data literacy
	Observations	All the participating school leaders and teachers of the different primary schools.	Added value Trust

Which school organizational characteristics are important for working with the data team method in primary education?	Focus-group interviews	All the participating school leaders and teachers of the different primary schools.	Voluntary Collaboration
	Individual interviews	School leader Data expert Teacher lower years Teacher upper years	Data attitude Data use
	Observations	All the participating school leaders and teachers of the different primary schools.	Comprehensibility Usefulness

3.4 Data analysis

The observation data and the interview data were transcribed verbatim. The program Atlas.ti was used for coding the transcripts, relating the coded fragments to each other, and comparing the codes of different schools and respondents, within and across cases (Boeije, 2002). A coding schedule was applied, based on the theoretical framework and research questions: 'What is the perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education' and 'Which school organizational characteristics are important for working with the data team method in primary education?' This coding schedule can be found in the appendices. With regard to the first research question, codes were, for example: 'comments about the content of the data team method' and 'whether the participants work on the assignments of step 2 (formulating hypotheses) of the data team method'. Relating to the second question, codes were, for example: 'description of the role of the school leader in the team during the workshop about the data team method' and 'the data expert is present at the workshop'. For each of the schools, a within-case analysis was conducted, followed by a cross-case analysis comparing the primary schools on each element of the coding schedule. This case-oriented approach was used to identify the similarities and differences of the primary schools that provided further insight in the theory about the use of the data team method in primary education and the school organizational characteristics that impact the use of the method in primary education (Miles et al., 2013).

3.5 Procedures

A systematized approach for data collection was followed in order to compare the results between respondents and between cases, which was consistent with the research questions to ensure reliability (Miles et al., 2013; Poortman & Schildkamp, 2011). By following the same procedures and conducting the same case study as described in this research, the same findings and conclusions will be obtained which minimizes the errors and biases in this study (Yin, 2003). The use of the data team method and the school organizational

characteristics for working with the data team method in primary education were studied thoroughly by using observations and interviews for data collection. The instruments were based on the theoretical framework. The instrument 'individual interview' was tested with one teacher from a primary school from the Netherlands to ensure reliability and to get information about the duration of the interview.

Construct validity was ensured by using data from observations of the workshop, focus-group interviews and individual interviews which led to the establishment of a chain of evidence, and by letting other educational researchers review the research for feedback, such as the first and second supervisor (Poortman & Schildkamp, 2011; Yin, 2003). The observational data were triangulated with the interview data (Boeije, 2002). Triangulation took place at the level of the respondents and at the level of the instruments (Dooley, 2001). School leaders, data experts and teachers are observed and interviewed. Observations, focus-group interviews and individual interviews are used as instrumentation. Approximately ten percent of all the items of the instrumentation were coded by two researchers for calculating the inter-rater reliability. A satisfactory Cohen's Kappa of 0.898 was found (Dooley, 2001).

Internal validity was enhanced by highlighting major patterns of similarities and differences between respondents' experiences and beliefs based on the aspects of the theoretical framework (Miles et al., 2013; Schildkamp & Poortman, 2013; Swanborn, 2013). For example, the role of the data expert in a data team is in all cases described. Those descriptions were context-rich, meaningful and thick.

External validity was ensured by providing case-specific and cross-case thick analyses (also including citations of respondents), and describing the congruence with the theoretical framework by using the same structure for describing important aspects (Creswell, 2009; Schildkamp & Poortman, 2013; Yin, 2003). This led to findings of the study which were generalizable to theoretical propositions, which gained insight into the two research questions. The use of the data team method in primary education should be studied more in depth in other researches (Miles et al., 2013). The workshops and focus-group interviews were videotaped and the individual interviews were audiotaped, which allowed for thorough analyses (Poortman & Schildkamp, 2011). As all workshops and interviews were given in the Netherlands, the citations were translated into English to be used for this thesis.

Misrepresentation and misinterpretation of interviewees' statements were avoided by member-checking (Onwuegbuzie & Leech, 2007; Poortman & Schildkamp, 2011). The individual interviews were summarized and sent to all the respondents with the question to reply if they did not agree with the content of the summary. A total of four respondents did not reply. The other eight respondents did reply and complimented how in depth the interviews were transcribed. One of these respondents also mentioned some additional information which could be useful for the results about her as a teacher, which were added to the interview results of this teacher.

4. Results: Within-case analysis

In this paragraph, each case will be described in detail. The perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education, and the school organizational characteristics for working with the data team method in primary education, are summarized.

4.1 Results case A

4.1.1 The comprehensibility, usefulness and added value of the data team method

Comprehensibility data team method

In the individual interview, all respondents described that the used concepts in the method are familiar to them. The school leader stated: *'The content and used words in the method are clear, organized and comprehensible for us in primary education.'* However, in the focus-group interview, the teacher who teaches the lower years stated that the concepts reliability and validity are difficult to understand, but that all other content of the method is easy to understand. Furthermore, a question is asked about vocabulary during the workshop in this school. The school leader asked the trainer to explain the concepts reliability and validity. In the individual interview, the school leader explained that she thinks these are difficult to comprehend for teachers. So, these perceptions are positive for the use of the method in primary education, because the results show that the content and vocabulary are easy to comprehend in this primary school. Still, results also showed that the concepts reliability and validity might be difficult to understand.

In addition, the respondents of the individual interviews and the focus-group interviews were all able to give a description of the data team method. The data expert described: *'Formulating a hypothesis about a problem, collecting data, such as observations and tests, control whether these data are reliable, and study whether the hypothesis is wrong or correct before implementing actions'.* The teacher who teaches the upper years described: *'By using data, possible causes will be studied and when the causes are correct, a solution should be found, and actions should be implemented.'* All respondents reproduced important content of the method in their description, so their ability to reproduce important content of the method is controlled, which is positive for the comprehensibility of the method in this primary school.

Usefulness data team method

In the workshop about the data team method, both groups of workshop participants were able to complete the assignment about step 2 (formulating hypotheses). A formulated hypothesis was, for example: *'The motivation of learners to read is not sufficient and should be increased.'* In addition, one group of participants was able to complete the assignment about steps 4-5-6 (data quality check, data analysis, interpretation and conclusions) and mentioned, for example: *'A test is taken twice with a learner without mentioning both scores, and a G score is entered in the student monitoring system which is not possible.'* However, the other group of participants found it difficult to complete the assignment about steps 4-5-6. They discussed with each other how they could

complete the fourth step. This group of participants did not comprehend the concepts reliability and validity, which was needed to complete step 4. During the moment of feedback with all the participants and the trainer, this group mentioned that when the trainer would guide them in working on step 4; it would be less difficult to complete the steps. Both groups of workshop participants asked questions during the completion of step 2 and steps 4-5-6 which showed their use of the steps of the data team method, for example: *'So we must actually study what is wrong with the current method instead of searching for other new methods when we define our hypothesis?'* These results of the observation show that participants in this primary school were able to work on assignments about the data team method, which is a positive result regarding the usefulness of the method for primary education. However, these results also show that working on assignments about steps 4-5-6 requires high level knowledge and skills of the data team.

Furthermore, all four respondents expressed positive *opinions* regarding the data team method. They found the eight steps useful, clear, and organized. In the individual interview, the school leader stated: *'Our school can work with this method and it is applicable for the teachers to use in practice, because the eight steps describe which actions should be taken next and the trainer guides the data team during the school year.'* The data expert stated that the steps are of a high-level and statistic knowledge is needed to complete the steps, for example to formulate a measurable hypothesis. In addition, she mentioned that teachers might think the eight steps are not work-related, because the procedure often focuses on overarching problems instead of studying, for example, the subject mathematics in the own class. The teacher who teaches the upper years described: *'We did not always understand how we could complete the task, because we are not used to analyze data so thoroughly.'* The member of the school board argued: *'I want to discuss with other school board members and with the school leader whether the method can get a place within the strategic policy of the school.'* He stated that this method definitely can be used in practice in primary education, because schools are willing to improve student results and with the guidance of trainers and the use of data of the own school, this can be achieved. These results show that in this primary school, the respondents think the method is useful for their school and in other primary schools which is beneficial for the use of the method in primary education. However, the results also show that some respondents think the eight steps are of a high level which is consistent with the results of the observation of the workshop participants in working on the steps.

Added value data team method

In the theoretical framework, it is described that the data team method has an added value when advantages of the method for using data are described by teachers, data experts, and school leaders in primary education. In the individual interview, the school leader described that an advantage of the method is the cyclic process in which the school can choose how fast they go through the eight steps. An added value described by the data expert is that the quality of data will be checked. In the focus-group interview, the data expert and the teacher who teaches the upper years described, that in-depth analyses can be made for the whole school or several classes together instead of focusing on your own class. Also, the data expert mentioned: *'With this method, teachers will be triggered to analyze data, which increases their knowledge and skills and teachers understand why it is important to use data in the school.'* In the individual interviews, the data expert and the teacher who

teaches the lower years stated that an advantage of this method is that data team members learn that intuitions about causes and problems are often not correct. The teacher who teaches the upper years and the teacher who teaches the lower years both stated they think the manual of the data team method is an added value, because it can be used as a reference to guide the teachers. The teacher who teaches the upper years described: *'The manual entails information to read, but also schemes which should be completed, so the method is theoretical and practical for us as teachers.* 'The teachers who teach in the lower years also described the collaboration in the team as an added value of the data team method. *'I find it so valuable that we can discuss together our problems and hypotheses, so that everybody is much more focused and to-the-point, because at this moment, the school leader and data expert mainly discuss problems in the school.'* These results show that many advantages of the method are described by the participants in this primary school. All those perceptions about the advantages of the method show the added value of the method. The added value of the method described in this primary school is positive for the use of the method in primary education.

4.1.2 School organizational characteristics for working with the data team method in primary education

Leadership

First, the school leader was *part of the data team*, because she was present at the workshop about the data team method. All four respondents described that the participation of the school leader in the data team is essential for implementing the method in primary education, because she has knowledge about analyzing data and can guide the data team members next to the trainers. For example, by giving concrete examples about which types of tests can be collected in their primary school when data should be collected in step 3 of the method.

Second, in the workshop about the method, it is not showed whether the school leader involved teachers and data experts in *formulating goals*, because a case of a fictitious primary school was used in which step 1 of the method (problem definition and formulation goals) was already given by the trainers, because otherwise, the workshop would take too much time. However, in the individual interview, the school leader described she wants to involve the whole school team in deciding on which problem and goals the data team is going to focus, to stimulate their motivation. For example, by sharing in meetings which problems arise in the school and discuss which problem should get attention first.

Third, the school leader explained in the individual interview that she wants to focus on *distributed leadership*, and likes to have an observing role in a data team, because she wants to control whether the decisions made by data experts and teachers are data-based and informed. *'Input of others is very important, because this might enlarge the commitment of them to analyze data, and I do not want to be the first person to say something or to make decisions by myself.'* The teacher who teaches the lower years agreed: *'It is important that all colleagues have a say in the data team, because this might increase the motivation of them to use the data team method.'* In the individual interviews, the teacher who teaches the upper years explained that the whole school team should be involved in choosing the problem and hypothesis when going through the eight steps, but that the school leader should choose the most important problem on which the data team should focus.

All four respondents described in the individual interviews, that during the workshop, the school leader acted as an equal part of the team and let others also make decisions. So, the results of this observation and of the interviews show that the school leader in this primary school tries to focus on distributed leadership, which is positive, because this might increase the engagement of all school team members to use the method.

Fourth, in the focus-group interviews, the respondents described that the school leader should structure time in using the data team method in primary education. Time to use the method is seen as a possible hindering factor, because many other aspects in the school also need time in addition to the time which is needed for going through the data team procedure. Therefore, the respondents described that when the method would be implemented in their school, the data team should get enough time, which is structured by the school leader, to complete each step in order to solve problems and meet goals. For example, when implementing the method in primary education, 45 minutes must be scheduled free every week by the school leader to let the data team members work with each other in completing the steps in addition to structuring time for the meetings with the trainer once in every three weeks.

Fifth, the school leader showed characteristics of *data literacy*. In the individual interview, the school leader mentioned that she has more experience with research and data than other colleagues in the school, because of her Master Educational Leadership. In the workshop, she explained the definition of reliability and validity. Also, according to the data expert, the school leader is able to analyze data and thereby, controls the progress of results. However, they both stated that the school leader always consults the data expert in data-based decision making. The data expert makes analyses of data of the whole school and the school leader has the responsibility to control the analyses to get an overview of the results in the school.

Sixth, the school leader also was a *model* for the data expert and teachers in using the data team method in the workshop. She used data to define the problem of the case, and checked the quality of the collected data by, for example, noticing that a G score was entered in the student monitoring system. Furthermore, she made conclusions based on the collected data. In addition, she asked: *'Can you relate the insufficient level of the test of AVI to the percentage of inadequate technical reading?'*

Seventh, in the workshop, the school leader showed characteristics of *teaching* teachers and data experts how to use the data team method, because she sometimes taught how the assignments had to be completed. For example, in completing step 2 of the method, she taught a teacher that motivation of learners to read can be measured. However, in the individual interview, the school leader described: *'I have the capability to understand the data team method and I can guide colleagues, but I am not able to teach and train the teachers and data expert.'* Apparently, the school leader feels she is not able to teach the data team how to use the method, but in the workshop, it is observed that she was able to teach certain aspects. In the individual interviews, all four respondents described that when their school would use the data team method; the guidance and support of the school leader next to the guidance and support of the trainers is essential. The school leader should have a leading role, in which she can clarify, for example, the concepts reliability and validity when working on the steps outside the meetings, and the trainers should guide the data team during the meetings by, for example, explain how a hypothesis can be formulated measurable. Therefore, in this primary school, the school leader and trainers are both important in teaching the data team how to use the data team method.

School culture

First, a focus on *data use* by the school team is shown in this primary school, because the school uses different types of data and base decisions on these data. In the individual interviews, all four respondents described that Cito scores are mainly used in analyzing data. In addition, the school leader stated: *'We use data about Cito scores, observations, social-emotional tests, and tests of, for example, mathematics and reading,'* However, in the focus-group interview, all respondents described that in the school, actions are taken too fast, intuition is used too often, and data are not analyzed in-depth. In addition, in the individual interview, the teacher who teaches the upper years explained: *'What is missing in our school is a clear continuous line which leads you from the problem to taking considered actions.'* So, in this primary school, there is a focus on data use in which different types of data are used, for example, to monitor results, but still data are not analyzed in depth and actions are taken too fast.

Second, results showed that *collaboration* takes place between the school leader, data expert, and teachers. In the individual interviews, all respondents stated that the school leader always collaborates with the data expert in making decisions based on data, and also collaborates with teachers in team meetings by giving opportunities to express opinions. The teacher who teaches the upper years stated: *'It is pleasant that the door of the office of the school leader is often open, because this makes it easier to discuss difficulties or share improvements of learners, which stimulates the collaboration.'* The teacher who teaches the lower years and the data expert described the importance of collaboration between data team members and non-data team members, because data should be shared. In the workshop about the data team method, the participants collaborated in working on the assignments of the steps. They discussed possible causes of the problem, and the quality of data, asked each other questions, and filled in the answers of the assignments together. Every participant has said something during the collaboration and they let each other finish their sentences. So, in this primary school, the school leader, data expert, and teachers collaborate with each other, which might be beneficial for the use of the data team method, because in a data team, the members should also collaborate by together analyzing causes of problems based on data in order to solve these problems.

Third, all four respondents described in the individual interviews that the *trus*t in each other is very strong and stimulated by sharing opinions in organized team meetings. The trust is seen by them as very important for implementing the method in their school, because the whole school team should be involved to solve problems and implement solutions, for example, by sharing data of the learners in the own grade. In the individual interview, all respondents described that the school leader meets teachers to discuss together how the teachers could professionalize, and that she asks teachers work-related questions, but also questions about their personal life. The school leader stated: *'A positive attitude to each other, sharing opinions, and focusing on the talents of each other to reach goals stimulates the trust.'* So, these results show that in this primary school, the school team has trust in each other which might promote the implementation of the method in their school, because in a data team, trust is also essential because data should be shared and actions should be implemented in the school.

Fourth, in the individual interviews, all respondents explained that *expectations and norms* regarding data use within the school are expressed by the school leader. The data expert and both teachers described that the school leader is ambitious and motivates the school team to develop professionalism by using data, but also

gives the opportunity and responsibility to set own boundaries. The school leader stated: *'Setting high goals and expectations for using data leads to an improvement of our education in the school, because teachers learn to adapt their teaching based on the data and to focus on the needs of students.'* These results show that the school team is accustomed to use data in the school because using data is already a norm. Therefore, teachers are less likely to return to old routines of making decisions based on intuition, which might promote the use of the data team method in their school.

Innovation attitude

First, in the individual interviews, all respondents stated they feel the school is *obliged* to use data. The school leader and data expert stated they feel obliged, because the results of the school have to be accounted by the local network of schools. The data expert mentioned: *'The use of the student monitoring system to collect data is an example of our agreements.'* The teacher who teaches the upper years and the teacher who teaches the lower years both stated that they want to have an overview of the results of children for themselves as a teacher in order to follow their progress, but that the data expert and the school leader also oblige the use of data. So, these results show that in this primary school, the respondents feel obliged to use data by several persons which might influence the use of the data team method in this school, because whether or not school leaders, data experts, and teachers feel an obligation to use data can have an impact on how training about the data team method will be received.

Second, in this primary school, results showed the *willingnes*s of respondents to use data. In the focus-group interview, the respondents mentioned that the willingness of the school team to use data and to use the data team method is essential for implementing the method, because their willingness is needed, for example, to implement actions, such as, adapting teaching strategies of teachers or changing the timetable of the school. In addition, they explained that data is important to get an overview of the progress of the individual learner, groups of learners, and the whole school, and that data can be used in meetings with parents or in discussions with other teachers. The data expert thinks that using data leads to professionalization as a data expert, but that it is very important to study data, for example, about how children learn, next to data about tests. In the individual interview, the school leader described: *'I am willing to use data in the school, because with data I am able to, for example, control whether learning results have improved and compare those results between different grades in the school.'* However, he stated that a hindering factor is that teachers are used to take quick actions instead of going through a long process of analyzing. The teacher who teaches the upper years emphasized that the amount of budget of the school should be considered. These results showed that in this primary school, the respondents are willing to use the method, for example, to control learning results and to professionalize. However, hindering factors are also mentioned, such as the attitude of teachers of taking quick actions.

Third, in the individual interviews, the four respondents all expressed the positive *emotion* happy to use data in their school. The school leader also feels joyful and curious, because she feels that she develops her professionalism in using data. The data expert also feels challenged to use data in the school. *'It certainly does not scary me off to use data, because the processes of children can be monitored and when progress of results is visible, I feel happy.*' The teacher who teaches the upper years stated: *'I associate positive emotions to data use,*

because I can control whether the results of the learners have increased.' The teacher who teaches the lower years described that data give her certainty, because she can use data to inform parents about the processes of her learners. So, in this primary school, positive emotions regarding data use are expressed, which might be beneficial for the use of the data team method in their primary school, because analyzing data in depth is the most important characteristic of the data team method.

Data expert

The development and training of the capacity of the school team in using data is essential in establishing effective data use in schools and training can be facilitated through internal support, for example by the data expert of the school itself. In this primary school, results showed that the data expert was part of the data team, because she was present at the workshop about the data team method. In the individual interviews, all four respondents described the role of the data expert as coaching the teachers in analyzing data, and discussing data in order to develop group plans to increase the results of children. The teacher who teaches the lower years described that she likes the supporting role of the data expert in analyzing data. *'The data expert explains difficult analyses in the student monitoring system and collaborates with teachers.'* The data expert explained that she gets much support from a network of other data experts, and from the school leader. In addition, she described: *'I am not able to guide the data team by myself, but with support from the trainers I would be able to guide the data team in this process.'* The teacher who teaches the upper years stated that the data expert could have a leading role in guiding the data team instead of the school leader. *'The data expert has more knowledge and skills with regard to data use compared to the school leader.'* The presence of the data expert in the data team is mentioned as important for implementing the method, because the respondents think she has the skills to explain difficulties between meetings. So, these results showed that in this primary school, the data expert can have an important role in guiding the data team in analyzing data, because she has knowledge and skills about using data, and already coaches the teachers often. However, in addition to the data expert, trainers are needed.

Prioritization

The presence of other important aspects in the school on which attention should be paid is mentioned by the respondents as an important *prioritization,* which could hinder the implementation of the data team method in their school. According to Begičević, Divjak and Hunjak (2009), the prioritization of projects in education, such as the data team method, is a complex process, and can be viewed from various perspectives. In this study, two perspectives should be taken into account. First, from the perspective of the institution, such as the primary school, that intends to apply for several projects, and therefore, needs to set priorities regarding which project to choose. Second, from the perspective of a group of an individual, such as the data team or the school leader, that should set priorities when working on a project. In this primary school, focusing on the merger between the primary school with another primary school next school year is seen as an important prioritization for their school instead of focusing on the implementation of the data team method.

4.2 Results case B

4.2.1 The comprehensibility, usefulness and added value of the data team method

Comprehensibility data team method

In the focus-group interview, the four respondents stated that the vocabulary is familiar. In the individual interview, the school leader described: *'The vocabulary was easy to understand and the content of the method is clear.'* However, the data expert wonders whether all the teachers understand certain concepts such as reliability, but likes the explanation of the words in the manual of the data team method. The teacher who teaches the lower years also stated that certain vocabulary is difficult to apply. *'I understand the concept reliability when I read the explanation in the manual, but I still find it difficult to check the reliability of a test.'* The teacher who teaches the upper years explained: *'The content of the method is easy to understand, and in the workshop I did not need to ask for clarification of certain vocabulary.'* Furthermore, in this primary school, no questions are asked about the vocabulary of the method, which provides positive information about the comprehensibility of the method in this primary school. So, in this primary school, it is mentioned that the concepts reliability and validity might be difficult to understand, but that all other content and vocabulary are easy to comprehend. These findings influence the possibility to use the method in primary education.

In addition, the respondents of the individual interviews and the focus-group interviews were all able to give a description of the data team method. The teacher who teaches the lower years described: *'A data team consists of teachers who teach in different grades, a data expert, a school leader, and a trainer. This team will analyze a problem, formulate and study hypotheses by using data to consider which actions should be taken. All eight steps should be taken once or more often before a problem can be solved and a new problem can be analyzed.'* The school leader explained: *'It is a procedure which can be used in the school to professionalize the school team, but also to improve student results in your own school by analyzing causes of problem in depth on school level, group level and individual level before taking actions immediately.'* The respondents reproduced important content of the method in their description, which is positive for the comprehensibility of the method in this primary school, and thereby is positive for the use of the method in primary education.

Usefulness data team method

In the workshop about the data team method, all groups of participants were able to complete the assignment about step 2 (formulating hypotheses). One group of participants mentioned, for example, motivation of students as a cause for low student results of reading comprehension. Another group of participants formulated the hypothesis: *'Students with a low level of technical reading also have a low level of reading comprehension.'* All groups of participants described that it was difficult to formulate a concrete and measurable hypothesis. All groups of participants were able to complete the assignment about steps 4-5-6 (data quality check, data analysis, interpretation and conclusions). One group of participants mentioned, for example: *'The scores of the test AVI are presented in the wrong standards, and a G score is entered in the student monitoring system which is not possible.'* All groups of participants asked questions during the completion of the assignments about step 2 and

steps 4-5-6 which showed their use of the steps of the data team method, for example: *'Should we always make a hypothesis which contains a control group?'* These results of the observation show that all groups of participants in this primary school were able to work on assignments about the data team method, which is a positive result regarding the usefulness of the method for primary education. However, these results also show that formulating a measurable and concrete hypothesis might be difficult.

Furthermore, in the focus-group interview and in the individual interviews, the opinions of the four respondents about the method were positive. In the individual interview, the school leader described: *'I see possibilities to use the data team method in primary education, because the results of learners, groups of learners, and the school as a whole can be identified and might be improved by analyzing the problem in depth and improving results is what schools are focused on.'* The data expert stated that the data team method guides them in analyzing in depth the actual problem instead of taking actions immediately. The teacher who teaches the upper years explained: *'The schemes guide you which actions should be taken in each step.'* In the focus-group interview, the teacher who teaches the lower years explained that the workshop was of a high-level and that thereby, the possibilities to collaborate in the workshop were pleasant, which made the workshop fun. *'It was a quest to formulate hypotheses and check the quality of data.'* These results show that in this primary school, the respondents think the method is useful for their school and other primary schools, which is beneficial for the use of the method in primary education. However, the results also show that some respondents think the eight steps are of a high level and that collaboration between data team members is important to use the steps.

Added value data team method

In the focus-group interview, all four respondents described that the method increases the knowledge and skills of the school team to use data. The eight steps of the method are challenging for data team members, because the steps are sometimes difficult and of a high level and this might put them on a higher level of data use, which can lead to an improvement of the education at the school. The school leader stated: *'It becomes clear which hypotheses are true, and which hypotheses were likely to be true, but turned out not to be true, and perhaps, fewer actions have to be implemented, because problems are analyzed in depth. In addition, this higher expertise of the data team members can be transferred to non-data team members in the school.'* In the focus-group interview, all four respondents described that the method ensures sustainability and continuity, because the attitude towards using data will be changed and skills will be improved, which enables using the method year after year in the school. In the individual interview, the data expert and the teacher who teaches the upper years stated that the different data team members can learn from each other, and that the school leader or data expert can lead the data team. The data expert and the teacher who teaches the lower years stated that the manual can be used as a reference to guide the data team and that the use of practical assignments and schemes next to theory is motivating for teachers in primary education, because they are used to work close to practice. According to the teacher who teaches the upper years, an advantage of the data team method is the focus on two goals: the professionalization of teachers, data experts, and school leaders, and analyzing and improving the student results. The teacher who teaches the lower years described that the methods takes into account the context of the school. *'The data team will consist of our own teachers, data experts, and school leaders of the*

school, and our data, children and situations will be used during the procedure.' These results show that many advantages of the method are described by the respondents in this primary school. All those perceptions about the advantages of the method show the added value of the method. The added value of the method described in this primary school is positive for the use of the method in primary education.

4.2.2 School organizational characteristics for working with the data team method in primary education

Leadership

First, the school leaders were *part of the data team*, because they were present at the workshop about the data team method. In the individual interviews, all respondents described the participation of the school leader in the data team as essential when implementing the method in primary education, because he should control whether the actions in step 7 are realistic to be implemented, and he should facilitate and control the process of the team.

Second, in the workshop about the method in this primary school, it is also not showed whether the school leader involved teachers and data experts in *formulating goals*, because the same case of a fictitious primary school was used in which step 1 of the method (problem definition and formulation goals) was already given by the trainers, because of the time. However, in the individual interview, the school leader described he wants to involve the whole school team in deciding on which problem and goals the data team is going to focus, to stimulate their enthusiasm. For example, he remembers that the trainer explained in the workshop that the school team could be involved by putting a large paper in the staff room where everybody can write down which problems arise in the school and which goals should be met. The school leader explained he would like to make use of those examples to involve the school team.

Third, the school leader described in the individual interview that he focuses on *distributed leadership*. *'I did not want to predominate in the workshop, because data experts and teachers should be able to analyze data by themselves for making decisions.'* In the individual interviews, the four respondents described that the school leaders acted as an equal part of the team in the workshop and that they made decisions just like others. So, in the workshop it is showed that the school leader in this primary school tries to focus on distributed leadership, which is positive, because this might increase the engagement of all school team members to use the method.

Fourth, in the individual interviews, the role of the school leaders are explained by the four respondents as monitoring and facilitating the process of the data team, for example, by giving *time* for the meetings of the method. Furthermore, they must ensure sustainability of the method. Time to use the method is seen as a possible hindering factor, because other important aspects in the school also should get attention.

Fifth, the school leaders show characteristics of *data literacy*. In the individual interviews, the respondents mentioned that the school leaders analyze the Cito test scores on group level and on school level to compare it with the last few years. In addition, they discuss the data with the data expert, and are focused on the evaluation of the school by the Inspectorate of Education. In the workshop, the school leader discussed the definition of reliability and validity with the participants.

Sixth, the school leaders also were a *model* for the data expert and teachers in using the data team method in the workshop. The school leaders mentioned possible causes for the problems of the case, such as time on the

timetable for reading comprehension. A school leader also mentioned that the hypothesis should be measurable. Both school leaders checked the quality of data by, for example, noticing whether the test of AVI is of good quality.

Seventh, in the workshop, the school leaders showed characteristics of *teaching* teachers and data experts how to use the data team method, because they sometimes taught how the assignments had to be completed. For example, a school leader taught a teacher who teaches the lower years how to interpret the relation between the percentages of the test AVI and the percentages of a test about reading comprehension. In the individual interview, the school leader stated: *'I know more about data-based decision making and collecting data than other teachers, and I could teach teachers how to use data to analyze results of the learners in their classroom, but I have not done that yet at this moment.'* So, the school leader feels he is able to teach the data team how to use the method, and in the workshop, it is observed that he was able to teach certain aspects. In the individual interviews, all four respondents described that the school leader does not need to lead the data team, because the data expert or coordinators also can lead the data team. In addition, they mentioned that the guidance of trainers to support the data team next to the school leader, data expert and coordinator is essential for using the method.

School culture

First, a focus on *data use* by the school team is shown in this primary school, because the school uses different types of data and base decisions on these data. In the individual interviews, all four respondents described that Cito scores are mainly used in analyzing data, and that the school uses data. The teacher who teaches the upper years mentioned: *'I use the Cito test scores to monitor the progress of the learners, but also for my task as coordinator of mathematics.'* However, in the focus-group, the respondents also described that the use of data is still limited, and should be analyzed more often and more in-depth. In the individual interview, the school leader mentioned that he thinks that teachers have too little knowledge and skills regarding data use, or that there is not enough time to analyze data in depth. In the focus-group interview, all respondents described the presence of coordinators in a data team as important for implementing the method, because they have knowledge about data of a certain subject in the school. So, in this primary school, there is a focus on data use in which different types of data are used, for example, to monitor results, but still data are not analyzed in depth.

Second, the *collaboration* between the school leaders, data experts and teachers is little. In the individual interview, the data expert stated: *'He often does not delegate, while he could benefit from the coordinators, data experts, and the teachers.'* The collaboration between teachers is stimulated through forming buddies between two teachers, to help each other and give feedback. The teacher who teaches the lower years stated that she likes to collaborate with other colleagues of the lower years. She also collaborates with the school leader, because she is the contact person of the school. In the workshop about the data team method, the participants collaborated in working on the assignments of the steps. They did not always let each other finish their sentences. They discussed measurable hypotheses and the reliability of tests. They read the questions, and filled in the answers of the assignments together. However, not every participant said something during the collaboration. In the focus-group interview, the respondents stated that collaboration and communication between data team members and non-data team members is very important, for sharing visions. So, results of the interviews

showed that in this primary school, there is little collaboration between the school leader, data experts, and teachers. Results of the workshop confirm that collaboration is not always evident. However, in the individual interviews, it is stated that there is collaboration between teachers by forming buddies. This collaboration is not beneficial for the use of the method in their school, because all data team members should together analyze causes of problems based on data, and collaborate with non-data team members for implementing actions.

Third, in the individual interviews, the four respondents described that there is *trust* in the school team, that opinions are shared, and that the trust keeps getting better because they know each other more in depth. In the focus-group interview, the respondents explained that a positive school culture with trust is essential for implementing the method, because, for example, concrete actions should be implemented in the school with the need of involvement of every member of the school team. So, these results show that in this primary school, there is trust in the school team which is beneficial for the use of the method in their school, because data should be shared in a data team and actions should be implemented in the whole school.

Fourth, in the individual interviews, all respondents mentioned that *high expectations* are expressed by the school leaders with regard to data use, to improve the skills of teachers, and to improve the results of the learners. The school leader described: *'Teachers must show and develop their qualities of data use, so I express high expectations, and use guidelines to observe and evaluate the skills of teachers.'* These results show that the school team is accustomed to use data in the school because using data is already a norm. Therefore, teachers are less likely to return to old routines of making decisions based on intuition, which might promote the use of the data team method in their school.

Innovation attitude

First, an *obligation* to use data in the school is felt by all the respondents. In the individual interview, the school leader described he feels the results of the school have to be accounted for by the government, the Inspectorate of Education, parents and learners. The data expert, the teacher who teaches the upper years, and the teacher who teaches the lower years stated that he school leaders and data experts obligate the school team to use tests of Cito and other methods, because they want to see the results of learners in order to analyze data of the whole school. So, these results show that in this primary school, the respondents feel obliged to use data by several persons which might influence the use of the data team method in this school, because whether or not school leaders, data experts, and teachers feel an obligation to use data can have an impact on how training about the data team method will be received.

Second, in this primary school, results showed the *willingnes*s of the respondents to use data. In the focus-group interview, the respondents described that the willingness of the whole school team to use data is a promoting factor for implementing the method, because data is needed when working with the method. In the individual interview, the school leader stated: *'It is important that every teacher in the school analyses his or her data, because the progress of learners should be monitored, and teachers should evaluate what could be improved.'* He would definitely like to join the course of the university about data-analyses, because he wants to improve his professionalism, and he thinks everybody in the school should be prepared to participate in a data team, to improve knowledge and skills regarding data use. The teacher who teaches the lower years stated that

data team members should be enthusiastic to ensure continuity of using the method in the school. In addition, she stated that the whole school team should take part in the course of the university about data analyses, to improve professionalism. She also described that changing the composition of the data team after a few years is essential for implementing the method. The data expert thinks data are a tool to improve education by, for example, adapting the instruction or change aspects of a current method, such as a mathematics method. The teacher who teaches the upper years described: *'I like to analyze the Cito test scores, because it triggers me to discover what can be improved, and I would like to use the data team method to gain more experience.'* A hindering factor to use the method mentioned by all four respondents is the amount of the budget. These results showed that in this primary school, the respondents are willing to use the data team method, for example, to professionalize. Important aspects are mentioned, such as, enthusiasm of data team members and participation of the whole school team in the course about data analyses. However, the amount of budget is mentioned as a hindering factor.

Third, all four respondents described positive emotions in the individual interviews. The data expert explained she feels curious and feels challenged to analyze the data in the school, because data can be used by teachers to improve results of the learners in the school. The teacher who teaches the upper years feels joyful when using data in the school, because she likes to monitor the progress of learners. The teacher who teaches the lower years described the emotion happy regarding data use in the school, because she thinks data use will lead to improvements of the education in their school. The school leader described positive and negative emotions regarding data use in the school. *'I am happy when I am able to analyze data in the school, but the outcomes of the analyses make me insecure and restless sometimes.'* So, in this primary school, positive and negative emotions regarding data use are expressed. Positive emotions regarding data use might be beneficial for the use of the data team method in primary education, because analyzing data in depth is the most important characteristic of the data team method. However, feeling insecure about student outcomes might also be beneficial for the use of the method in primary education, because by feeling insecure, they might understand that they can influence student results, for example, by changing their instruction, instead of believing that others are responsible.

Data expert

The development and training of the capacity of the school team in using data is essential in establishing effective data use in schools and training can be facilitated through internal support, for example by the data expert of the school itself. In this primary school, results showed that the data experts were part of the data team, because they were present at the workshop about the data team method. The role of the data expert as described by the four respondents in the individual interviews is coaching the teachers in analyzing data, observing learners and teachers, and monitoring the quality of teaching by analyzing and discussing data with the school leaders and teachers. According to the school leader, the data experts are the coordinators of the pupil care. The data expert stated: *'I could have an important role in guiding a data team, because I have knowledge and skills regarding data use, but trainers of the university should also have an important role in guiding the data team.'* The school leader stated that the data experts are very important to him for analyzing data, and all four

respondents stated that they think the data experts can have an important role in the data team, because they have knowledge and skills to analyze data. The presence of the data experts in the data team is mentioned as important for implementing the method, because next to the guidance of the trainers during the meetings, guidance is needed between the meetings. So, these results showed that in this primary school, the data expert can have an important role in guiding the data team in analyzing data, because she has knowledge and skills about using data, and already coaches the teachers often. However, in addition to the data expert, trainers are needed to guide the data team.

Prioritization

The presence of other important aspects in the school on which attention should be paid is mentioned by the respondents as an important *prioritization,* which could hinder the implementation of the data team method in their school. In this primary school, focusing on the implementation of a new student monitoring system next school year is seen as an important prioritization for their school next to focusing on the implementation of the data team method.

4.3 Results case C

4.3.1 The comprehensibility, usefulness and added value of the data team method

Comprehensibility data team method

In the focus-group interview, all four respondents described that the content and vocabulary of the method is comprehensible. In the individual interview, the data expert mentioned: *'The used concepts, such as data analyses and frequency-percentages, are familiar to me. All aspects in the method are described in detail.'* The teacher who teaches the lower years stated: *'The words in the method are often familiar to me, and new words will automatically be learned when going through the steps.'* In addition, in this primary school, no questions are asked about the vocabulary of the method, which provides positive information about the comprehensibility of the method in this primary school. Those perceptions of the respondents have a positive influence in the possibility to use the method in primary education, because in this primary school, the content and vocabulary of the method are comprehended by the school leaders, data experts, and teachers.

Furthermore, the respondents of the individual interviews and the focus-group interviews were all able to give a *description* of the data team method. The teacher who teaches the upper years described: *'When problems arise in the school, a team of six to eight persons will formulate hypotheses about causes of the problem, choose one hypothesis, and collect data to solve the problem.'* The school leader explained: *'Using different types of data to solve a problem and to formulate hypotheses in order to improve the education at our school.'* All descriptions show that the respondents were able to reproduce important content of the method, which is positive for the comprehensibility of the method in this primary school, and thereby is positive for the use of the method in primary education.

Usefulness data team method

In the workshop about the method, both groups of participants were able to complete the assignment about step 2 (formulating hypotheses). One group of participants discussed how to make the hypothesis 'low interaction reading comprehension with other teaching subjects causes low reading comprehension results' measurable. The other group of participants mentioned, for example, the hypothesis: *'We think that 60 percent of the teachers have insufficient teaching skills to teach reading comprehension.'* Both groups of participants described that it was difficult to formulate the hypothesis concrete and measurable. In the completion of steps 4-5-6 (data quality check, data analysis, interpretation and conclusions), one group of participants mentioned: *'For the test DMT is a G score given which is not possible, the test DMT is conducted twice for one learner, and the scores of the test AVI are presented in the wrong standards.'* The other group of participants studied the percentages presented in data tables, made conclusions based on the data, and explained for example: *'A high correlation is only seen between AVI and reading comprehension, namely 76 percent.'* One group of participants did not have sufficient time to work on step 6 of the assignment about steps 4-5-6. During the moment of feedback with all the participants and the trainer, this group mentioned that when having more time; they should be capable to complete step 6. Both groups of participants also asked questions during the completion of the steps which showed their use of the data team method, for example: *'Should we always collect data for a period of three years?'* These results of the observation show that all groups of participants in this primary school were able to work on assignments about the data team method, which is a positive result regarding the usefulness of the method for primary education. However, these results also show that formulating a measurable and concrete hypothesis might be difficult, and that enough time is essential to complete all the steps.

Furthermore, in the focus-group interview and the individual interviews, all respondents expressed positive *opinions* regarding the data team method. In the individual interview, the school leader mentioned that the eight steps of the method are of a high level, but ensure a continuous line in which analyzes can take place. *'By using this method, the problem will be analyzed in depth, which leads to well thought causes and hypotheses on which actions can be based which might lead to an improvement of results.'* However, a data expert stated that the attitude of immediately taking actions remains. A teacher who teaches the upper years stated the eight steps ensure working in small steps, and that actions are not taken too fast. Another teacher who teaches the upper years thinks it is interesting to read articles to gather information for formulating hypotheses and to professionalize. These results of the opinions show that in this primary school, the respondents think the method is useful for their school and other primary schools, which is beneficial for the use of the method in primary education. However, the results also show that some respondents think the eight steps are of a high level and that their attitude of taking actions immediately should be changed.

Added value

In the theoretical framework, it is described that the data team method has an added value when advantages of the method for using data are described by teachers, data experts, and school leaders in primary education. An advantage of the method described in the individual interviews by the school leader, data expert and teacher

who teaches the lower years is the availability of the manual to guide the data team members through the procedure and to read back information about the steps. In the individual interviews, the school leader and the teacher who teaches the upper years explained the advantage of discussions between six to eight data team members, because those discussions might lead to more knowledge and skills with regard to data than discussions between one or two persons which normally take place. Another advantage mentioned by those respondents is a change of their attitude regarding data which is essential to improve education, because at this moment the use of intuition for making decisions takes place too often. In the individual interview, the data expert described: *'By using the method, the data team will develop their professionalism regarding data use*.' These results show that many advantages of the method are described by the respondents in this primary school. All those perceptions about the advantages of the method show the added value of the method. The added value of the method described in this primary school is positive for the use of the method in primary education.

4.3.2 School organizational characteristics for working with the data team method in primary education

Leadership

First, the school leaders were *part of the data team*, because they were present at the workshop about the data team method. However, in the individual interviews, the teachers mentioned whether the school leaders should take part in a data team, because they have less knowledge of the daily practice. They stated the school leader should control the data team, for example, by discussing the progress of the data team with one data team member every three weeks. However, the data expert and the school leader think the school leader should take part in a data team, because they have knowledge about data. All respondents mentioned that the school leader should create promoting conditions, such as time, for the process of the data team.

Second, in the workshop about the method in this primary school, it is also not showed whether the school leader involved teachers and data experts in *formulating goals*, because the same case of a fictitious primary school was used in which step 1 of the method (problem definition and formulation goals) was already given by the trainers, because of the time. However, in the individual interview, the school leader described she wants to involve the data team in deciding on which problem and goals they are going to focus in order to stimulate their motivation.

Third, the school leader explained in the individual interview that she wants to focus on *distributed leadership*. In the individual interviews, the school leader and data expert described that coordinators, teachers, and data experts should also make decisions next to the school leaders. The school leader, data expert, and the teacher who teaches the lower years described in the individual interviews, that during the workshop, the school leaders acted as an equal part of the team and made decisions just like other participants. However, the teacher who teaches the upper years explained that in the workshop, she sometimes experienced that the school leaders were also a little dominantly present. This teacher felt the analyses in the workshop were difficult, but noticed that the school leaders found it less difficult, and that many answers were given by them. So, these results show that the school leaders would like to focus on distributed leadership, but that in the workshop, the possibility to make decisions is not always felt by all respondents.

Fourth, in the individual interview, the school leader stated she wants to facilitate *time* for using the method. *'Teachers must understand that the use of data and the use of the data team have an added value for the school and for learners, because results will be improved, and I would like to give time for this.'* In the focus-group interview, the respondents mentioned that the time to use the method is seen as a possible hindering factor, because much time is needed to analyze one hypothesis and time is needed for other (unforeseen) concerns during the school year. Therefore, they described that the school leaders should give time to use the method during the school year, for example, by giving time for the collaboration between data team members outside the meetings.

Fifth, the school leader showed characteristics of *data literacy*. In the individual interviews, the four respondents mentioned that the school leaders analyze Cito test scores, and that the school leaders and data experts together analyze other types of data of the school. Also, twice a year a meeting is planned with each teacher to discuss the results. In addition, they demonstrate data to the Inspectorate of Education, stimulate the use of data for the improvement of the education at their school, and want to become an excellent school. In the workshop, they explained the words reliability and validity.

Sixth, the school leaders also were a *model* for the data expert and teachers in using the data team method in the workshop. They mentioned some hypotheses, and explained that those should be measurable and concrete. In addition, they checked the quality of data and pointed at the high correlation between the test of AVI and reading comprehension. Furthermore, they asked questions regarding data us, for example: *'How do you explain the low correlation between reading comprehension and the tests DMT and technical reading?'*

Seventh, in the workshop, the school leader showed characteristics of *teaching* teachers and data experts how to use the data team method, because they, for example, taught the participants how to formulate and interpret the hypothesis. In addition, they asked several questions to deepen the answers of the teachers and data expert. The school leader stated in the individual interview: *'When I notice that colleagues find it difficult to complete, for example, step 3 of the method, I want to teach them how they should collect data to complete this step.'* In the individual interviews, all respondents described that the school leaders should control the progress of the data team and should create promoting conditions, but that the data expert or coordinators can lead the data team, because they also have knowledge about data. All four respondents described that guidance and support of trainers next to the guidance of the school leader, data expert and coordinators is important for implementing the method.

School culture

First, a focus on *data use* by the school team is shown in this primary school. In the individual interviews, all four respondents stated that the school uses data, such as test and observations, to monitor results. Cito test scores are analyzed by the data experts and the school leaders, and are being discussed with the school team. The school leader described: *'I notice that the teachers gradually analyze data more often to get an overview of the results of their learners.'* However, in the focus-group interview, the respondents described that data should be used more in-depth. In the workshop about the data team method, the school leader mentioned that when problems arise in the school, the school team wants to implement actions immediately. The teacher who teaches

the upper years mentioned that in analyzing data in the school, a control group has never been used. Furthermore, in the individual interviews, the school leader, data expert, and the teacher who teaches the lower years described the different levels of knowledge and skills of school leaders, data experts, and teachers in their school to use data in-depth can be a hindering factor for implementing the data team method, because in teacher education, less attention is paid to using and analyzing data. In the focus-group interview, all respondents described the presence of coordinators as important for implementing the data team method. So, in this primary school, there is a focus on data use in which different types of data are used, for example, to monitor results, but still data are not analyzed in depth and actions are taken too fast.

Second, in the individual interviews, the four respondents mentioned that there is little *collaboration* between the school leaders and teachers. Collaboration only takes place in special subject groups, team meetings, study days, and discussions about teachers' professionalization. The teacher who teaches the lower years explained that collaboration often takes place between the school leaders and data experts, because the primary school is large. In the workshop about the data team method, collaboration took place between the participants. They discussed possible hypotheses, chose one hypothesis together, and discussed quality of tests. However, in one group of the workshop, the school leaders and data experts often collaborated and discussed together, and teachers spoke much less. In both groups, the assignments were read out loud, and they let each other finish their sentences. In the focus-group interview, the involvement of the whole school team through collaboration and communication between data team members and non-data team members is mentioned as important. So, results of the interviews showed that in this primary school, there is little collaboration between the school leader and teachers, but high collaboration between the school leader and data experts. Results of the workshop showed collaboration between all data team members, but also confirmed that school leaders and data experts mostly collaborated. It is essential that all data team members collaborate by together analyzing causes of problems based on data in order to solve these problems, and collaborate with non-data team members.

Third, *trust* in the school team is felt by the four respondents. In the focus-group interview, the respondents described that trust in the school team is essential for implementing the data team method, because the whole school team is involved when, for example, solutions should be implemented in the classrooms. In the individual interview, the data expert explained: *'When there would be no trust in each other, I would not still be working. Trust is very important in a school team for sharing visions.'* The teacher who teaches the upper years and the teacher who teaches the lower years mentioned that the school leaders express the trust in the school team during study days and team meetings. The school leader described: *'At this moment, we have twenty classes in our primary school in which there is trust in our large school team, but it takes time to get to know each other in depth.'* So, these results show that in this primary school, the school team has trust in each other which might promote the implementation of the method in their school, because in a data team, trust is also essential because data should be shared and actions should be implemented in the whole school.

Fourth, in the individual interviews, all four respondents described that *high expectations* are expressed by the school leaders. The school leader stated that high goals should be set for the teachers, data experts, and learners and that data should be used in setting those goals. Also, the teacher who teaches the upper years mentioned that the school leaders express high expectations regarding the use of data to monitor the progress of

learners. These results show that the school team is accustomed to use data in the school because using data is already a norm. Therefore, teachers are less likely to return to old routines of making decisions based on intuition, which might promote the use of the data team method in their school.

Innovation attitude

First, all four respondents mentioned in the individual interviews that they feel *obliged* to use data in the school by the Inspectorate of Education and the school board. Furthermore, the school leader also feels obliged by the parents. The data expert also feels obliged by the school leaders. The teacher who teaches the upper years also feels obliged by herself as a teacher. The teacher who teaches the lower years also feels obliged by the data experts. So, these results show that in this primary school, the respondents feel obliged to use data by several persons which might influence the use of the data team method in this school, because whether or not school leaders, data experts, and teachers feel an obligation to use data can have an impact on how training about the data team method will be received.

Second, in this primary school, results showed that respondents have the *willingnes*s to use data. In the focus-group interview, the respondents mentioned that the willingness of the school team to use data is essential for implementing the method, because data should be used when working with the method. In the individual interview, the school leader stated that he thinks data-based decision making can improve the education at her school, develops professionalism and decreases the use of intuition. The school leader and the teacher who teaches the lower years both mentioned an experience of success to increase the motivation of the data team as important when using the method. The data expert, the teacher who teaches the upper years, and the teacher who teaches the lower years stated that an introduction of the method to the whole school given by the trainers in which agreements are made, for example, about the role of each data team member, and enthusiastic data team members, is important. The data expert mentioned: *'In the workshop, teachers participated who were already motivated to use data, because they are a language specialist or a coordinator of mathematics, but teachers who only have the task to teach should also participate in a data team and be enthusiastic.'* The shared vision of the school team that teachers are very important to improve the results is described as a promoting factor of their school. A hindering factor described in the focus-group interview by all four respondents is the small amount of data team members compared to the size of the whole school team in the primary school, because decisions, for example which actions should be implemented in the school, should be discussed with the whole school team. In addition, the school leader wonders whether the actions gained after the data team procedure are practical to use by teachers in the classroom. Furthermore, the data expert and school leader mentioned the amount of paperwork instead of implementing improvements. These results showed that in this primary school, the respondents are willing to use the data team method, for example, to improve education. Important aspects are mentioned, such as gaining an experience of success. However, hindering factors are also mentioned, for example, the small size of the data team.

Third, positive *emotions* are expressed in the individual interviews by the four respondents. The school leader and data expert express the emotion 'happy' when they use data in the school. The school leader mentioned: *'I feel happy, because actual problems and causes in the school can be analyzed by using data,*

instead of only using intuitions in taking actions.' The data expert described: *'An overview of the results of all learners in the school can be given with the use of data.'* The teacher who teaches the upper years described the emotion 'joyful' regarding data use in the school, because she thinks data use will lead to improvements of the results of the learners in the classroom. The teacher who teaches the lower years stated: *'I feel positive emotions, such as happy, when I see progress in the results of my learners, but I feel negative emotions, such as sad, when the results of my learners are little bit disappointing.'* Positive emotions regarding data use might be beneficial for the use of the data team method in primary education, because analyzing data in depth is the most important characteristic of the data team method. However, feeling sad about student outcomes might also be beneficial for the use of the method in primary education, because by feeling sad, they might understand that they can influence student results, for example, by changing their instruction, instead of believing that others are responsible.

Data expert

The development of the capacity of the school team in data use is essential in establishing effective data use in schools. Training can be facilitated through internal support, for example by the data expert of the school itself. In this primary school, results showed that the data experts were part of the data team, because they were present at the workshop about the data team method. In the individual interviews, the role of the data experts is described as coordinating the pupil care, coaching the teachers in analyzing the results of learners in-depth, and observing teachers and learners. The data expert described their role also as controlling group plans, writing policy plans, and reading articles about data-based decision making. The teacher who teaches the upper years described that twice a year, the Cito test results are being discussed with the data experts, and sometimes also with a school leader. All respondents mentioned that the data experts are very busy, because each data expert has to analyze the results of 250 learners. All four respondents described in the individual interviews that the data experts should have an important role in the data team, because they have knowledge about analyzing data, and also about the daily practices of teachers. The school leader and the teacher who teaches the upper years think the presence and guidance of the data expert in the data team is essential for implementing the method. In the individual interview, the school leader stated: *'I think we have the most supporting role in using data, but the data experts are slightly taking over this role and could guide a data team next to the guidance of trainers of the university.'* So, these results showed that in this primary school, the data expert can have an important role in guiding the data team in analyzing data, because they have knowledge and skills about using data, and already coach the teachers often. However, in addition to the data expert, trainers are needed to guide the data team.

Prioritization

The presence of other important aspects in the school on which attention should be paid is mentioned by the respondents as an important *prioritization*, which could hinder the implementation of the data team method in their school. In this primary school, focusing on the implementation of new methods for language and vocabulary next school year is seen as an important prioritization for their school next to focusing on the implementation of the data team method.

5. Results: Cross-case analysis

In this paragraph, the three cases are compared on elements of the theoretical framework. The perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education, and the school organizational characteristics for working with the data team method in primary education, are summarized. Relevant themes and differences will be discussed.

5.1 The comprehensibility, usefulness and added value of the data team method

First, positive perceptions about the comprehensibility of the method are given by the respondents of the three primary schools, which influences the possibility to use the method in primary education, see table 5. Vocabulary was familiar and easy to understand, but in cases A and B, some respondents mentioned the concepts reliability and validity as difficult to understand. Furthermore, results showed that in one primary school, a question is asked by the school leader about whether the trainer could explain the concepts reliability and validity, because she thought these were difficult to comprehend for teachers. No other questions regarding the vocabulary are asked in the three schools, which is positive for the comprehensibility of the method and influence the possibility to use the method in primary education. In addition, respondents reproduced important content of the method in their description, which is positive for the comprehensibility of the method in those primary schools, and thereby is positive for the use of the method in primary education. However, there were sometimes differences. In case A, the description given by the data expert described some steps of the data team procedure: *'Formulating a hypothesis about a problem, collecting data, such as observations and tests, control whether these data are reliable, and study whether the hypothesis is wrong or correct before implementing actions'.* However, in case B, the description given by the school leader is more focused on the two goals of the method: *'It is a procedure which can be used in the school to professionalize the school team, but also to improve student results in your own school by analyzing causes of problem in depth on school level, group level and individual level before taking actions immediately.'* In case C, the description given by the teacher who teaches the upper years is more focused on the data team: *'A team of six to eight persons will formulate hypotheses about causes of a problem in the school, choose one hypothesis, and collect data to solve the problem.'*

Second, results showed that the respondents of the three primary schools were able to work on assignments about the data team method in the workshop, which is a positive result for the possibility to implement the method in primary education. In case B and C, respondents described that it was difficult to formulate the hypothesis concrete and measurable (step 2). In addition, some respondents of case A found it difficult to work on the assignment about steps 4-5-6, because they did not comprehend the concepts reliability and validity, which was needed to complete step 4. Some respondents of case C did not have sufficient time to work on step 6 of the assignment about steps 4-5-6. During the moment of feedback with the trainer, all respondents mentioned that having time and the guidance of trainers in working on the steps are important. In the workshop, the participants of the three primary schools asked questions during the completion of step 2 and steps 4-5-6. For example, in case A: *'So we must actually study what is wrong with the current method instead of searching for other new methods when we define our hypothesis?'*, for example, in case B: *'Should we always make a*

hypothesis which contains a control group?', and for example in case C: *'Should we always collect data for a period of three years?'* All these questions showed their use of the steps of the data team method.

Furthermore, results showed that in the three primary schools, the respondents think the method is useful for their schools and for other primary schools. However, there are some differences in reasoning. In case A, they think the method is useful because the eight steps clearly describe which actions should be taken next and because the trainers can guide the data team during the school year. In case B, they think the method is useful because schools want to identify and improve the results of their school, and that the schemes of the eight steps can guide them in this process. In case C, they think the method is useful because by analyzing problems in schools in depth, results might improve and professionalization can take place. In addition, they described that the steps ensure a continuous cycle for analyzing problems which is positive for the sustainability of the method in schools. In all primary schools, the respondents think the eight steps are of a high level. In case A, results showed that not all respondents are used to analyze data in depth. In case B, results showed that some respondents think that collaboration between data team members is important to use the eight steps. In case C, the results showed that some respondents think that their attitude of taking actions immediately should be changed.

Third, results showed that many advantages of the method are described by the respondents in the three primary schools. Similarities and differences are found between those advantages. In all schools, the manual as a reference, the increase in knowledge and skills of data team members to analyze data in-depth, and the collaboration between data team members were mentioned. In cases A and B, the combination of theory and practice and the triggering of teachers were described. In cases B and C, the professionalization of data team members to analyze data in-depth, the improvement of education, and the increase in data attitude were mentioned. In addition, in case A, the cyclic process of the eight steps, the check of the quality of data, and a less use of intuition are described. In case B, the sustainability of the method and the focus on the own school are described as added values. All those perceptions about the advantages of the method show the added value of the method. The added value of the method described in those primary schools is positive for the possibility to implement the method in primary education. The main similarities and differences of the comprehensibility, usefulness, and added value are described in table 5.

Table 5.

The comprehensibility, usefulness and added value of the data team method for the use in primary education.

	Case A	Case B	Case C
Comprehensibility	Method is comprehensible. Vocabulary familiar. Reliability and validity difficult to understand. Description described steps of the method.	Method is comprehensible. Vocabulary familiar. Reliability and validity difficult to understand. Description described the two goals of the method.	Method is comprehensible. Vocabulary familiar. Description described the data team.

Usefulness		Trainers should help to complete step 2.	Trainers should help to complete step 2.
	Some difficulties with completing steps 4-5-6, because of concepts.	No difficulties with completing steps 4-5-6.	Some difficulties with completing steps 4-5-6 because of time.
	Eight steps describe actions to take and trainers can guide data team.	Schemes of eight steps are guiding in identifying and improving results.	Continuous cycle eight steps to analyze problems, improve results and professionalism.
	Trainer must pay attention to capability of the data team to analyze data.	Collaboration between data team members should be promoted.	Trainers should emphasize that analyses take time and actions should not be taken too fast.
Added value	Theory and practice	Theory and practice	
	Triggering teachers	Triggering teachers	
	Cyclic process	Professionalization	Professionalization
	Check quality data	Improvement education	Improvement education
	Less use intuition	Data attitude	Data attitude
		Sustainability	
		Focus own school	

5.2 School organizational characteristics for working with the data team method in primary education

5.2.1 Leadership

First, in all three cases, the school leaders were *part of the data team*, because they were present at the workshop about the data team method. In case A and B, the participation of the school leader in the data team is seen as important for implementing the method, see table 6. In case A, they think this is important because the school leader has knowledge about analyzing data and can guide the data team members next to the trainers. In case B, because they think the school leader should control whether the actions in step 7 are realistic to be implemented, and because the school leader should facilitate the process of the data team. However, in case C, three respondents wondered whether the school leader should take part in a data team, because they have less knowledge of the daily practice. All respondents think the school leaders should discuss the progress of the data team with, for example, a data team member after each data team meeting.

Second, results of the workshop in the three primary schools did not show whether the school leaders involved teachers and data experts in *formulating goals*, because a case of a fictitious primary school was used in which step 1 (problem definition and formulation goals) was already given by the trainers, because of time. However, in all cases, the school leaders described they want to involve the whole school team in deciding on which problem and goals the data team is going to focus. In cases A and C, the school leaders want to involve the school team, because they want to stimulate their motivation. For example, by discussing in team meetings which school problem should get attention first. In case B, the school leader wants to involve the school team, because he wants to stimulate their enthusiasm. For example, he remembers that the trainer explained in the

workshop that the school team could be involved by putting a large paper in the staff room where everybody can write down which problems arise in the school and which goals should be met.

Third, in cases A and B, results showed that both school leaders focused on *distributed leadership*. In case A, the school leader wants to control whether data experts and teachers make data-based decisions and thinks input of others is very important to enlarge their commitment to analyze data. In case B, the school leader thinks data experts and teachers should be able to analyze data by themselves for making decisions. In the workshop, the school leaders behaved equivalent to other participants and gave the data experts and teachers the autonomy to make decisions. In case C, results showed that the school leader would like to focus on distributed leadership, but that in the workshop, the possibility to make decisions is not always felt by all teachers.

Fourth, the results of the three schools showed that the school leader should structure *time* to use the method. In case B, results showed that the school leader should also ensure sustainability, for example, by scheduling time for collaboration and data team meetings every school year. In addition, the school leader should also set priorities, for example, by compensating time of teachers to participate in data team meetings with fewer obligations for a data team member to take part in other school projects. In all three primary schools, time to use the method is seen as a possible hindering factor, because in addition to the time which is needed for going through the data team procedure, time is also needed for other aspects in the school.

Fifth, results revealed that all school leaders showed characteristics of *data literacy*. They mainly analyze the Cito test scores as type of data, and discuss the data with the data experts. In case A, the school leader attended the Master Educational Leadership in which she learned in depth how to analyze data which increased her data literacy. In cases A and B, the school leaders were able to explain and discuss the concepts reliability and validity in the workshop, which also showed their data literacy.

Sixth, the school leaders also were a *model* for the data experts and teachers in using of the data team method in the workshop. In case B, the school leader mentioned possible causes for the problems of the case, such as less time on the timetable for reading comprehension. In cases B and C, the school leaders explained that the hypothesis should be measurable and concrete by using percentages. In all schools, the school leaders checked the quality of the collected data by, for example, noticing that a G score was entered in the student monitoring system and noticing that the scores of the test AVI are presented in the wrong standards. In case A and C, questions regarding data use were asked by the school leaders which also showed their data literacy. In case A, for example: *'Can you relate the insufficient level of the results of the test of AVI to the percentage of inadequate technical reading?'* and in case C, for example: *'How do you explain the low correlation between reading comprehension and the tests DMT and technical reading?'*

Seventh, the school leaders showed characteristics of *teaching* the data team how to use the method, because they taught them how the assignments had to be completed. In case A, for example, the school leader taught a teacher, when working on step 2 of the method, that motivation of learners to read can be measured. In case B, for example, the school leader taught a teacher how to interpret the relation between the test about AVI and the test about reading comprehension in step 6. In case C, for example, the school leader taught a teacher that in step 2, the hypothesis should be formulated measurable by using percentages. In case A, the school leader wonders whether she is able to teach the data team how to use the method. In case B and C, the school leaders

feel they are able to teach the data team how to use the method. In case A, respondents described that the school leader should have a leading role in which she can clarify certain things, for example, the concepts reliability and validity, when working on the steps outside the meetings. However, in cases B and C, the respondents described that the school leader does not need to lead the data team, because the data expert or coordinators also can lead the data team. In all primary schools, the respondents described the guidance and support of the trainers to teach the data team as essential. These findings will be explained more in depth in the conclusion.

Table 6

School organizational characteristic leadership.

	Case A	Case B	Case C
Part of data team	Important. Knowledge about analyzing data, guide the data team.	Important. Control actions in step 7, facilitate process data team.	Less important. Discuss the progress of the data team after meetings.
Formulating goals	Involve school team. Stimulate motivation.	Involve school team. Stimulate enthusiasm.	Involve school team. Stimulate motivation.
Distributed leadership	School leaders, data experts, and teachers.	School leaders, data experts, and teachers.	School leaders and data experts.
Time	Structure time.	Structure time. Ensure sustainability. Set priorities.	Structure time.
Data literacy	Analyzes Cito test scores. Discuss with data expert. Explain difficult words Master Educational Leadership.	Analyze Cito test scores. Discuss with data experts.	Analyze Cito test scores. Discuss with data experts. Explain difficult words
Model	Causes for problem Check quality data Question about relation between AVI and technical reading.	Hypothesis measurable Check quality data	Hypothesis measurable Check quality data Question about correlation reading comprehension and technical reading.
Teach	Guided step 2 School leader wonders is able to teach data team Leading role Guidance of trainers.	Guided step 6 School leader feels able to teach data team Others leading role Guidance of trainers.	Guided step 2 School leader feels able to teach data team Others leading role Guidance of trainers.

5.2.2 School culture

First, a focus on *data use* by the school team is shown in the three primary schools, because the schools use different types of data and base decisions on these data, see table 7. The respondents described that Cito test scores are mainly used in analyzing data, but that other types of data, such as observations, are also used. The Cito test scores are mostly analyzed by the data experts and the school leaders. In the three primary schools, all respondents described that in the school, actions are taken too fast, intuition is used too often, and that the use of data is still limited, and should be analyzed more often and more in-depth. In cases B and C, the respondents described the presence of coordinators in a data team as important for implementing the data team method, because they have knowledge about data of a certain subject in the school. In case C, the respondents described that the different levels of data use of school leaders, data experts, and teachers can be a hindering factor for implementing the method, because in teacher education, less attention is paid to use and analyze data, and when using the method to analyze problems, a certain level of data use is needed.

Second, in all the cases, *collaboration* often takes place between data experts and teachers, and between teachers and other teachers. In case B, there is little collaboration between the school leaders and others. *'He often does not delegate, while he could benefit from the coordinators, data experts, and the teachers.'* In case C, there is little collaboration between the school leaders and teachers, and collaboration often takes place between the school leaders and data experts, because the primary school is large. However, in case A, results showed that collaboration takes place between the school leader, data expert, and teachers. The school leader collaborates with the data expert in making decisions based on data, and also collaborates with teachers in team meetings. In cases A and C, collaboration was evident in the workshop about the data team method, because the participants discussed possible hypotheses and the quality of data, asked each other questions, and filled in the answers of the assignments together. In case B, collaboration was not always evident in the workshop about the data team method, because the participants did not always let each other finish their sentences and because not every participant said something during the collaboration. In all three primary schools, the importance of collaboration between data team members and non-data team members is described, for sharing data and sharing visions.

Third, in the primary schools, the respondents described that there is *trus*t in each other. In cases A and C, the trust is very strong and stimulated by sharing opinions and visions in organized team meetings. In case B, the *trust* in each other gets better, because opinions are shared and they know each other more in depth. In all primary schools, the respondents explained that trust is essential for implementing the method, because the trust of every member of the school team might be needed, for example, to implement concrete actions in the school or to solve problems, for example, by sharing data of the learners in the own grade.

Fourth, in all primary schools, the respondents mentioned that *high expectations* are expressed by the school leaders with regard to data use, to improve the skills of teachers, and to improve the results of the learners. In case A, the school leader stated that high expectations might lead to an improvement of education in the school, because teachers learn to adapt their teaching based on the data and to focus on the needs of students. In case B, the school leader stated that by expressing high expectations, teachers might improve their teaching qualities and skills. In case C, the school leader stated that high expectations to use data and setting goals might improve the skills to monitor the progress of learners and teachers.

Table 7

School organizational characteristic school culture.

	Case A	Case B	Case C
Data use	Different types of data. School leader and data expert analyze Cito. Data not analyzed in depth.	Different types of data. School leader and data experts analyze Cito. Data not analyzed in depth. Coordinators important.	Different types of data. School leader and data experts analyze Cito. Data not analyzed in depth. Coordinators important. Different levels of data use might be hindering.
Collaboration	Between school leader, data expert, and teachers. Evident in workshop.	Little between school leader and others. Teachers collaborate with teachers and data experts. Not always evident in workshop.	Often between school leaders and data experts. Teachers collaborate with teachers and data expert. Evident in workshop.
Trust	Strong.	Present and gets better.	Strong.
Expectations	High. Improvement skills to adapt teaching and focus on student needs.	High. Improvement teaching qualities and skills of teachers.	High. Improvement skills to monitor progress of learners and teachers.

5.2.3 Innovation attitude

First, in all three primary schools, an *obligation* to use data in the school is felt by some respondents, see table 8. In all schools, an obligation by the school leaders and data experts is felt. In addition, in case A, the results of the school have to be accounted by the school board and themselves as teachers. In case B, the results of the school have also to be accounted by the government, the Inspectorate of Education, parents and learners. In addition, in case C, the results of the school have to be accounted by the Inspectorate of Education, school board, parents, and themselves as teachers. However, in all three primary schools, there were also respondents who did not feel obliged to use data in the school. So, whether or not school leaders, data experts, and teachers feel an obligation to use data can have an impact on how training about the data team method will be received, because data should be used in working with the method.

Second, in all the cases, the *willingness* to use data in the school is mentioned. In case A, the respondents described that it might be possible to implement the data team method in their school, because the school team has the willingness to use data, for example, to get an overview of the progress of the learners of the school, to inform parents or to discuss results with other teachers which might lead to professionalization. In case B, the respondents described that it might be possible to implement the data team method in their school, because the

school team has the willingness to use data, for example, to monitor the progress of learners, to evaluate what could be improved, and to adapt instruction or change aspects of a current method, such as a mathematics method. The school leader would definitely like to join the course of the university about data-analyses, because he wants to improve his professionalism, and he thinks everybody in the school should be prepared to participate in a data team, to improve knowledge and skills regarding data use. In case C, the respondents described that it might be possible to implement the data team method in their school, because the school team has the willingness to use data, for example, to improve the education in the school, to develop professionalism and to decrease the use of intuition.

Also, important aspects for implementing the method are mentioned. In case B, enthusiasm of data team members to stimulate the continuity of using the method in the school, the participation of the whole school team in the course about data analyses and changing the composition of the data team after a few years to improve professionalism are described. In case C, an experience of success to increase the motivation of the data team, an introduction of the method to the whole school given by the trainers in which agreements are made, for example, about the role of each data team member, enthusiastic data team members to ensure sustainability of the method, and a shared vision of the school team that teachers are very important to improve the results are described.

However, hindering factors are also mentioned which should be considered when implementing the method. In case A, the attitude of teachers to take quick actions instead of going through a long process of analyzing and the amount of budget of the school are described. In case B, the amount of the budget is described. In case C, the small amount of data team members compared to the size of the whole school team in the primary school is described, because decisions, for example which actions should be implemented in the school, should be discussed with the whole school team. In addition, whether the actions gained after the data team procedure are practical to use by teachers in the classroom and the amount of paperwork instead of implementing improvements are described.

Third, in all three primary schools, positive *emotions* to use data in the school are expressed, such as, happy and joyful. In case A, the emotions curious, challenged, and certainty are also expressed, because professionalism in using data can be increased, the processes of children can be monitored to control whether the results of the learners have increased, and data can be used to inform parents about the processes of her learners. In case B, the emotions curious, challenged are also expressed, because data can be used to monitor progress of leaners, to improve results of the learners in the school, and to improvement the education in the school. However, the emotions insecure and restless are also described by one respondent, when data shows that the outcomes of students are low. In case C, the emotions happy and joyful are expressed, because actual problems and causes in the school can be analyzed instead of only using intuitions in taking actions, and because data can be used to monitor the progress learners to improve their results. However, the emotion sad is also described by one respondent, when the results of learners are little bit disappointing. So, in these primary schools, positive and negative emotions regarding data use are expressed.

Table 8

School organizational characteristic innovation attitude.

	Case A	Case B	Case C
Obligation		Government	
		Inspectorate of Education	Inspectorate of Education
	School board		School board
	School leader	School leaders	School leaders
	Data expert	Data experts	Data experts
	Self as a teacher		Self as a teacher
		Parents	Parents
		Learners	
Willingness	Professionalization.	Professionalization.	Professionalization
	Overview progress of learners.	Overview progress of learners.	Improve education.
	Inform parents.	Adapt instruction.	Decrease intuition.
	Discuss with teachers.	Evaluate results.	
		Enthusiastic data team.	Enthusiastic data team.
		Participation whole school team in course university data analyses.	Experience of success. Introduction method whole school team to make agreements.
		Changing composition data team after few years.	Shared vision school team importance of teachers.
	Amount of school budget.	Amount of school budget.	Small amount data team.
	Attitude of teachers to take quick actions.		Actions practical for teachers.
			Amount of paperwork.
Emotions	Happy	Happy	Happy
	Joyful	Joyful	Joyful
	Curious	Curious	Sad
	Challenged	Challenged	
	Certainty	Insecure	
		Restless	

5.2.4 Data expert

In all three cases, the data experts were part of the data team, because they were present at the workshop about the data team method, see table 9. In all primary schools, the role of the data experts is described as coaching teachers in analyzing data. However, there are also differences in the description of their role. For example, in case A, the role of the data expert is also described as discussing data in order to develop group plans to increase the results of children, explaining difficult analyses in the student monitoring system, and

collaborating with teachers. In case B, their role is also described as observing learners and teachers, monitoring the quality of teaching by analyzing and discussing data with the school leaders and teachers, and being the coordinator of the pupil care. In case C, the role of the data experts is also described as coordinating the pupil care, analyzing the results of learners in-depth, observe teachers and learners, coordinating that tests are taken, controlling group plans, writing policy plans, and reading articles about data-based decision making.

In case A, the data expert described that she is not able to guide the data team by herself, but when having support from the trainers, she would be able to guide the data team in this process. A teacher also stated that the data expert could have a leading role in guiding the data team next to trainers, because the data expert has the skills to explain difficulties between meetings. In case B, the data expert stated that she could have an important role in guiding a data team, because she has knowledge and skills regarding data use, but that trainers of the university should also have an important role in guiding the data team. All respondents also stated that they think the data experts can have an important role in the data team, because they have knowledge and skills to analyze data, and because next to the guidance of the trainers during the meetings, guidance is needed between the meetings. In case C, all respondents described that the data experts should have an important role in the data team, because they have knowledge about analyzing data, and also about the daily practices of teachers. The presence and guidance of the data expert in the data team described as essential for implementing the method, because they could collaborate with teachers and guide them in analyses between the meetings. In addition, the school leader stated that the data experts are slightly taking over the supporting role of the school leaders to support others in data use, and that the data experts could guide a data team next to the guidance of trainers of the university.

Table 9

School organizational characteristic data expert.

	Case A	Case B	Case C
Part of data team	Important. Leading role in data team. Support from the trainers	Important. Leading role in data team. Support from the trainers	Important. Leading role in data team. Support from the trainers.
Role	Coach teacher how to analyze data. Discuss data. Explaining difficult analyses to teachers. . Guide data team with trainers.	Coach teachers how to analyze data. Discuss data. Observe learners and teachers. Coordinator pupil care. Guide data team with trainers.	Coach teachers how to analyze data. Discuss data. Observe learners and teachers. Coordinating pupil care. Write policy plans. Reading articles data. Control group plans. Guide data team with trainers.

5.2.5 Prioritization

In all three primary schools, focusing on other important aspects in the school on which attention should be paid instead of focusing on implementing the data team method is mentioned, which can be related to a new factor *prioritization,* and might hinder the implementation of the data team method in schools, see table 10 (Begičević, Divjak, & Hunjak, 2009). In case A, focusing on the merger between the primary school with another primary school next school year is seen as an important prioritization for their school instead of focusing on the implementation of the data team method. In case B, focusing on the implementation of a new student monitoring system next school year is seen as an important prioritization for their school instead of focusing on the implementation of the data team method. In case C, focusing on the implementation of a new method for language and vocabulary next school year is seen as an important prioritization for their school instead of focusing on the implementation of the data team method.

Table 10

School organizational characteristic prioritization .

	Case A	Case B	Case C
Type	Merger between the primary school with another primary school next school year.	Implementation of a new student monitoring system next school year.	Implementation of a new language and vocabulary method next school year.

6. Conclusions

6.1 The comprehensibility, usefulness and added value of the data team method

The first research question was: What is the perception of school leaders, data experts and teachers about the comprehensibility, usefulness, and added value of the data team method for the use in primary education? In this study, the concepts reliability and validity were sometimes mentioned as difficult to understand, and one question is asked about those concepts. So, when the method will be used in primary education, attention should be paid, for example by the developers of the method or by trainers, to clarify those concepts to ensure that data team members will understand these. For example, a scheme of difficult concepts with explanation can be developed, which can be added to the manual of the method. In addition, respondents were able to reproduce important content of the method in their description, such as content about some steps of the data team procedure, about the two goals of the method, or about the data team, which is a positive result for the comprehensibility of the method in those primary schools.

Results also showed that the respondents were able to work on assignments about the data team method in the workshop and that they think the method is useful, which is a positive result for the possibility to implement the method in primary education. However, close attention should be paid by the trainers in guiding the data team members in depth when working on step 2 (formulating hypotheses) by, for example, explaining that a hypothesis will be more measurable and concrete by using percentages. In addition, attention should be paid by the trainers in guiding the data team members to apply the concepts reliability and validity when working on step 4 (check quality data). For example, by explaining that using data from three cohorts is important for the reliability and using recent data is important for the validity. Also, attention should be paid, for example, by the trainer or school leader, that sufficient time is given to work on the steps. Furthermore, attention should be paid by the trainer to the capability of the whole data team to complete step 5 (data analysis) by, for example, explaining how a data table can be developed and by forming buddies between two data team members to discuss difficulties between meetings. Also attention should be paid to by the trainer to the attitude of the data team by, for example, emphasizing that analyses take time and actions should not be taken immediately.

In this study, advantages of the method were also mentioned. For example, the increase in knowledge and skills to analyze data, less use of intuition, combination of theory and practice, a focus on problems in the own school, and professionalization are described. All those perceptions about the advantages of the method show the added value of the method. The added value of the method described in those primary schools is positive for the possibility to implement the method in primary education.

In conclusion, these results showed that the method, which is already implemented in secondary education, is also comprehensible, useful and added valued by respondents of three primary schools, which is positive for the use of the method in primary education. Furthermore, two of the three schools who participated in this study have, a couple weeks after the workshop, already expressed that they want to participate in the trajectory of the data team method in primary education next school year, which is also a positive result for using the method in primary schools.

6.2 School organizational characteristics for working with the data team method in primary education

The second research question was: Which school organizational characteristics are important for working with the data team method in primary education? Results showed that leadership, school culture, the data expert, innovation attitude and prioritization are important school organizational characteristics. The role of the school leader, coordinators, and data experts in data teams in primary education are essential to study in following research.

Leadership

Results showed that in this study, not all respondents of the primary schools stated that the school leader should participate in a data team, because they have less knowledge of practice. They should facilitate the process of the data team and discuss their progress without participating in a data team. However, in secondary education, school leaders participate in data teams, because they have different perspectives on data use than data experts and teachers. In addition, they have an important role in supporting data use by data team members. Research of data teams in secondary education has shown the importance of the participation of the school leader, so, when starting with a pilot of data teams in primary education, the school leader should participate in the data team to study their importance.

In this study, the school leaders of the three primary schools described they want to involve the whole school team in deciding on which problem and goals the data team is going to focus. In secondary education, the importance of involving the school team in formulating goals is shown for stimulating shared visions and goals in the school, and for promoting commitment of the school team to use the data team method. Therefore, when using the method in primary education, the school leader should formulate goals together with data experts and teachers at the start of the first step of the data team method.

Distributed leadership is not shown in all three primary schools. However, in secondary education, evidence showed the importance of giving autonomy to data team members to make certain decisions based on data. Therefore, when implementing the method in primary education, the school leader should focus on distributed leadership, for example, by dividing tasks to data team members in which they should decide whether certain data is reliable.

In all three primary schools, result showed the importance of structuring time by the school leader to use the method. Research about data teams in secondary education also showed the importance of time. Therefore, when implementing the method in primary education, the school leader should structure enough time to work with the method, for example, by scheduling 45 minutes free every week for data team members to work with each other in addition to structuring time for the meetings with the trainer once in every three weeks.

In this study, all school leaders showed characteristics of data literacy. Cito test scores are mainly used as type of data. In secondary education, research showed that data literacy of the school leader is important to control the results of the school by analyzing data in depth when participating in a data team. Therefore, when using the method in primary education, school leaders should be able to analyze all kinds of types of data. For example, when the problem in the school is too much bullying in the upper grades, the school leader should be able to analyze surveys about how learners feel in the classroom with other learners.

The school leaders of the primary schools in this study were also a model for the data experts and teachers in using data. In secondary education, research showed the importance of modeling, because teachers and data experts can observe what is expected of them and feel more comfortable in engaging in this new method. In addition, modeling might lead to an increase in the ability of teachers and data experts to analyze data. Therefore, when implementing the method in primary education, the school leaders should actively use data in the school, describe how important data use is, and be enthusiastic about data use.

In secondary education, the school leader has an important role in teaching the data team how to use data, to enlarge the sustainability of the method. However, in this study, not all respondents of the primary schools stated that the school leader should teach them how to use the data team method, but that data experts or coordinators should teach them. In addition, not all school leaders felt they are able to teach data teams how to use the method, because they have not had adequate training in analyzing and interpreting data and have difficulties to teach teachers and data experts how to use data. However, in this study, all school leaders showed characteristics of teaching.

School culture

In this study, results showed that in addition to secondary education, primary schools also have difficulties with analyzing data. So, when using the method in primary education, the trainer should learn the data teams how to analyze data in depth, for example, by developing graphs. In addition, just like the implementation of data teams in secondary education, attention should be paid to the level of teachers of primary education in using data, because in teacher education, less attention is paid to analyze data, while a certain level of data use is needed by all data team members. Also, just like in secondary education, there are teachers in primary education who coordinate, for example, the learning of a certain subject in the whole school. However, in this study, results showed that close attention should be paid to the presence of these coordinators in data teams, because they have knowledge about data of a certain subject in the school.

Just like research about collaboration in data teams in secondary education, this study showed the importance of collaboration in a data team, and between data team members and non-data team members. When implementing data teams in primary education, attention should be paid to the collaboration, because in this study, collaboration takes often only place between data experts and teachers, and between teachers and other teachers. Collaboration between data team members can be stimulated, for example, by forming buddies between two members in which difficulties regarding data use can be discussed. Collaboration and communication between data team members and non-data team members can be stimulated, for example, by putting a paper in the staff room where everybody can write down which problems arise in the school and which goals should be met, or by sharing the progress of the data team in team meetings with the whole school team.

Furthermore, this study showed that just like in secondary education, trust between all members of the school is important, for example, to share data in a data team and to implement concrete actions in the whole school. The trust might be improved, for example, by making shared agreements at the start of meeting 1 about how to approach each other.

In addition, this study showed that when school leaders of primary schools express expectations and norms regarding data use, the school teams are already accustomed to use data. Thereby, they are less likely to return to old routines of making decisions based on intuition, which might promote the use of the data team method in primary education. This finding is consistent with expressing expectations and norms to data teams in secondary education. When implementing the method in primary education, it is important that expectations and norms are also expressed regarding the data team meetings, to improve professional accountability. For example, by expecting that after a meeting, every data team member get tasks which should have been performed before the next meeting is scheduled in order to share the outcomes when this next meeting actually takes place.

Innovation attitude

Results showed that some respondents felt an obligation to use data in the school, for example, by the Inspectorate of Education, school leader, or data expert. Whether or not school leaders, data experts, and teachers feel an obligation to use data can have an impact on how training about the data team method will be received, because data should be used in working with the method. Therefore, when implementing the method, the school teams in primary education should understand, just like school teams in secondary education, why data is important, and should understand that the goal of getting trained in using the method is to improve learning results and to improve their professionalism. For example, those goals can be explained to the school team in an introduction meeting of the data team method.

In this study, the results showed that the three primary schools are willing to use data which is positive for the use of the method in other primary schools. Still, attention should be paid to certain aspects when implementing the method in primary education. Some of these aspects are also important when implementing the method in secondary education, such as the enthusiasm of data team members, the amount of budget and an experience of success to increase motivation. For example, the costs for implementing the method should be in line with the budget of schools for implementing innovations, such as compensating the costs by making agreements that the university can study the use of the method. However, other aspects are important for implementing the method in primary education, such as the participation of the whole school team in the course about data analyses, because often, school teams in primary schools are smaller than in secondary schools, which enables professionalism in the whole school.

Positive and negative emotions regarding data use are expressed in the three primary schools which might both be beneficial for the use of the data team method in primary education. Attention should be paid to increase positive emotions, because using data in depth is the most important characteristic of the data team method. However, attention should also be paid to negative emotions, because by feeling those emotions, teachers, data experts, and school leaders might understand that they can influence student results. Both emotions should be controlled when implanting the method in primary education, but also when implementing the method in secondary education.

Data expert

The result of this study showed that the data experts in the three primary schools have an important role in using data in the school. Thereby, results showed that they could have a leading role in guiding the data team in their school, because they have knowledge and skills regarding data use and regarding the daily practice of teachers, but also already collaborate with teachers and coach them often. All data experts expressed that they would be able to guide the data team in their process between data team meetings when having support from trainers of the university. However, in secondary education, the data experts participate in a data team, but do not have such an important role in the data team, because the school leader has this leading role to teach the data team how to use data. When implementing the method in primary education, close attention should be paid to whether the data expert is able to give internal support to the teachers, because training the school team in using data might be difficult for data experts, because not only knowledge and skills to use data are needed, but also knowledge and skills to guide the school team. However, these knowledge and skills can be developed by participating in a data team and by learning from the trainers through external support about how to guide a data team in order to ensure sustainability of using the method in primary education when having finished the trajectory of the university. Research of data teams in secondary education has shown the importance of the role of the school leader in teaching data teams, so, when starting with a pilot of data teams in primary education, the school leader and data expert should both participate in the data team to study their importance and their roles.

Prioritization

The results of this study of the three primary schools showed that when implementing the method in primary education, many prioritizations should be considered. When implementing the data team method in primary education, the priority should be set to choose the data team method as the project to focus instead of or next to other implementations, and the data teams and school leaders should also set priorities. For example, to choose a problem (step 1) with the data team, after the merger between two primary schools, to ensure that the problem is supported by the whole new school team. The school leaders should set priorities, for example, by not obligating teachers and data experts to take place in other projects of professionalization when participating in the data team method trajectory.

7. Discussion

7.1 Limitations of this study

This study has some limitations based on the instrumentation. According to Yin (2008), a limitation of interviews include: response bias. Respondents could have given social desirable answers to the interviewer instead of giving answers according to their true beliefs and the interviews might have been time consuming for the respondents, so they might have given answers quickly without fully agreeing with these answers. However, two of the three participating primary schools have also already expressed that they want to participate in the trajectory of the data team method in primary education next school year which confirms they fully agree with their answers and truly belief that the method can be used in primary education. The observations and interviews have been videotaped or audiotaped. A limitation of this is that respondents might have felt stressed or behaved differently than usual (Dooley, 2001). However, the workshops and interviews took place in their own primary schools, and the researcher reassured the respondents that the results of this study will only be used for the research of the University of Twente. Moreover, the results of this study might be limited as they only describe results from three primary schools. However, school team members with different functions have been interviewed and nine to sixteen school team members have been observed in each school, which leads to a broader and in-depth understanding. The presence of the researcher might have influenced the behavior of the respondents. However, in order to minimize this, the researcher was during the observations on the background as much as possible. Also, because of the reliability of this study, the code scheme has been refined several times, and coded with a second researcher. Her findings strongly agreed with the findings of the researcher.

7.2 Theory and practice

The use of the data team method in primary education has not been studied before. Therefore, the present study focused on providing insight into whether the data team method can be used in primary education, and into the school organizational characteristics for working with the method in primary education.

The method was found comprehensible, useful and added valued to be used in the three primary schools. Trainers should pay attention to guide data team members in formulating hypothesis concreate and measurable (step 2), to guide them in understanding and applying the concepts reliability and validity to check the quality of data (step 4), and to guide them in analyzing data (step 5). Giving time to data team members by trainers and school leaders is essential. Still, more research is needed to study the data team method in other primary schools regarding the comprehensibility, usefulness and added value of the method.

Furthermore, four school organizational characteristics were found to be essential when using the method. Also, a new factor ‘prioritization’ was found essential when implementing the method. The role of the school leader and the role of the data expert might be different in data teams in primary education compared to their role in data teams in secondary education. These insights might be of use to primary schools, which would like to start with a data team, as it will provide them with insight into the characteristics for working with the method, but also might be of use for research about data-based decision making in primary education.

This study showed that when implementing the method in primary education, leadership is essential. Cohen-Vogel and Harrison (2013), Datnow and Hubbard (2014) and other additional literature also stated that leadership is important to support data use. However, it is remarkable that results of this study showed that school leaders might do not need to participate in data teams, and should facilitate the process of the data team and discuss their progress without participating in a data team. Therefore, more research is needed to study whether in primary schools, the participation of school leaders in data teams might be less important. Results also showed data experts and coordinators might have an important leading and teaching role when implementing the method in primary education, because they have knowledge and skills regarding data use and regarding the daily practice of teachers, already collaborate with teachers or have knowledge about data of a certain subject in the school (Pameijer & Van Beukering, 2006). However, in secondary education, the data experts or coordinators might participate in a data team, but do not have such an important role in the data team, because the school leader has this leading role to teach the data team how to use data. Therefore, more research is needed to study the importance of the participation of school leaders, data experts, and coordinators in data teams in primary education, because these new findings about their roles have never been found in research about data teams in secondary education. So, if schools are aware of those school organizational characteristics; they might ensure, for example, that all data team members get time from the school leader to use the method and that the data expert is able to guide the data team between and in the data team meetings next to the guidance of trainers.

The results of this study are positive for using the data team method in primary education. When starting with a pilot of primary schools next school year, it is important that the role of the school leader and data expert in data teams in primary education will be studied in depth, because their role might be different compared to their role in data teams in secondary education. The results about the school organizational characteristics school culture, innovation attitude and prioritizations are consistent with the results of using the data team method in secondary education.

Further research should explore, for example, the different functions of school leaders, data experts, teachers and coordinators in data teams in primary education, the collaboration between data team members during the trajectory of the method in primary education, or the professional development of data team members when using the data team method in primary education.

8. References

Algozzine, K. M., Friend, C.A., McRae, D., & Seifert, A. (2011). *Evaluation of the Data Wise Improvement Process*. Charlotte, NC: Charlotte-Mecklenburg Schools, Chief Information Office, Center for Research & Evaluation, 1-67.

Baarda, D. B., de Goede, M. P. M., & van der Meer-Middelburg, A. G. E. (2007). *Basisboek interviewen.* Handleiding voor het voorbereiden en afnemen van interviews. Groningen: Wolters-Noordhoff.

Begičević, N., Divjak, B., & Hunjak, T. (2009). Decision-making on prioritization of projects in higher education institutions using the analytic network process approach. *Central European Journal of Operations Research, 18*(3), 341-364. doi: 10.1007/s10100-009-0113-3

Boeije, H. (2002). A purposeful approach to the constant comparative method in the analysis of qualitative interviews. *Quality and Quantity, 36*(4), 391-409.

Bokhorst, K. (2002). *Praktijkboek interne begeleiding.* Baarn: HB Uitgevers.

Carlson, D., Borman, G. D., & Robinson, M. (2011). A multistate district-level cluster randomized trial of the impact of data-driven reform on reading and mathematics achievement. *Educational Evaluation and Policy Analysis, 33*(3), 378-398. doi: 10.3102/0162373711412765

Cohen-Vogel, L. & Harrison, C. (2013). Leading with data: Evidence from the national center on scaling up effective schools. *Leadership and Policy in Schools, 12*(2), 122-145. doi: 10.1080/15700763.2013.792934

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA: Sage Publications.

Datnow, A. & Hubbard, L. (2014). *Teachers' Use of Assessment Data to Inform Instruction: Lessons from the Past and Prospects for the Future.* American Educational Research Association, 1-40.

Datnow, A., Park, V., & Kennedy-Lewis, B. (2013). Affordances and constraints in the context of teacher collaboration for the purpose of data use. *Journal of Educational Administration, 51*(3), 341-362. doi: 10.1108/09578231311311500

Dooley, D. (2001). *Social Research Methods*. New Jersey: Pearson.

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

Ikemoto, G. S. & Marsh, J. A. (2007). Cutting through the "data driven" mantra: Different conceptions of data-driven decision making. In P. A. Moss, P. A. (Ed.), *Evidence and Decision Making*. USA: Wiley Blackwell

Ingram, D., Louis, K. S., & Schroeder, R. (2004). Accountability policies and teacher decision making: Barriers to the use of data to improve practice. *Teachers College Record, 106*(6), 1258-1287.

Inspectie van het Onderwijs. (2013). *De staat van het onderwijs.* Onderwijsverslag 2011/2012. Utrecht: Inspectie van het Onderwijs. Retrieved at February 11th, 2014 from http://www.onderwijsinspectie.nl/binaries/content/assets/Onderwijsverslagen /2013/onderwijsverslag-2011-2012-printversie.pdf

Kallenberg, T., Koster, B., Onstenk, J., & Scheepsma, W. (2011). *Ontwikkeling door onderzoek*. Een handreiking voor leraren. Amersfoort:ThiemeMeulenhoff.

Krueger, R. A. (2000). *Focus Groups: A Practical Guide for Applied Research*. Thousand Oaks, CA: Sage Publications.

Lai, M. K. & Schildkamp, K. (2013). Data-based decision making: An overview. In K. Schildkamp, M. K. Lai & L. Earl (2013b). *Data-based Decision Making in Education: Challenges and Opportunities* (pp. 49-67). Dordrecht: Springer.

Ledoux, G., Blok, H., Boogaard, M., & Krüger, M. (2009). *Opbrengstgericht werken.* Over de waarde van meetgestuurd onderwijs (Data-driven decision making: the value of data-driven education). Amsterdam: SCO-Kohnstamm Instituut.

Levin, J. A. & 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, 23*(2), 179-201. doi: 10.1080/09243453.2011.599394

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). Making Sense of Data-Driven Decision Making in Education. *RAND Research Areas,* 1-18.

McCann, C. & Cohen Kabaker, J. (2013). Promoting Data in the Classroom. Innovative State Models and Missed Opportunities. *New America Foundation*, 1-26.

McNaughton, S., Lai, M. K., & Hsiao, S. (2012). Testing the effectiveness of an intervention model based on data use: A replication series across clusters of schools. *School Effectiveness and School Improvement, 23*(2), 203-228. doi: 10.1080/09243453.2011.652126

Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative Data Analysis. A Methods Sourcebook (3rd edition)*. Thousand Oaks, CA: Sage Publications.

Moolenaar, N., Daly, A., & Sleegers, P. (2010). Occupying the principal position: Examining relationships between transformational leadership, social network position, and schools' innovative climate. *Educational Administration Quarterly, 46*(5), 623-670. doi: 10.1177/0013161X10378689

Murray, J. (2013). Critical issues facing school leaders concerning data-informed decision-making. *School Leadership & Management, 33*(2), 169-177. doi: 10.1080/13632434.2013.773882

Onwuegbuzie, A. J. & Leech, N. L. (2007). A call for qualitative power analyses. Quality & Quantity: *International Journal of Methodology, 41,* 105-121. doi:10.1007/s11135-005-1098-1

Pameijer, N. K. & van Beukering, J. T. E. (2006). *Handelingsgericht werken: een handreiking voor de interne begeleider: samen met ouders en kind aan de slag*. Uitgeverij Acco.

Poortman, C. & Schildkamp, K. (2011). Alternative quality standards in qualitative research? Dordrecht: Springer. doi: 10.1007/s11135-011-9555-5

Schildkamp, K. & Ehren, M. C. M. (2012). From "intuition" to data-based decision making in Dutch secondary schools? In K. Schildkamp, M. K. Lai., & L. Earl (2013b). *Data-based Decision Making in Education: Challenges and Opportunities* (pp. 49-67). Dordrecht: Springer.

Schildkamp, K., Ehren, M., & Lai, M. K. (2012a). 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, 23*(2), 123-131.

Schildkamp, K. & Handelzalts, A. (2011). *Collaborative Data Teams for School Improvement*. Enschede: Universiteit Twente, 1-16.

Schildkamp, K. & Kuiper, W. (2010). Data-informed curriculum reform: Which data, what purposes, and promoting and hindering factors. *Teaching and Teacher Education, 26*, 482-496. doi:10.1016/j.tate.2009.06.007

Schildkamp, K. & Lai, M. K. (2013). Introduction. In K. Schildkamp, M. K. Lai & L. Earl (2013b). *Data-based Decision Making in Education: Challenges and Opportunities* (pp. 49-67). Dordrecht: Springer.

Schildkamp, K., Lai, M. K., & Earl, L. (2013b). *Data-based Decision Making in Education: Challenges and opportunities.* Dordrecht*:* Springer.

Schildkamp, K. & Poortman C. (2013). Factors Influencing the Functioning of Data Teams. Enschede: Universiteit Twente, 1-32.

Schildkamp, K., Poortman, C., & Handelzalts, A. (2013a). Data Teams for School Improvement. *Teaching and Teacher Education,* 1-19.

Schildkamp, K., Rekers-Mombarg, L. T. M., & Harms, T. J. (2012b). Student group differences in examination results and utilization for policy and school development. *School Effectiveness and School Improvement, 23*(2), 229-255.

Supovitz, J.A., & Tognatta, N. (2013). *The impact of distributed leadership on collaborative team decision making. Leadership and Policy in Schools, 12*, 101-121.

Swanborn, P. G. (2013). *Case studies: wat, wanneer en hoe?* Den Haag: Boom Lemma uitgevers.

Terhart, E. (2013). Teacher resistance against school reform: Reflecting an inconvenient truth. *School Leadership & Management, 33*(5), 486-500. doi: 10.1080/13632434.2013.793494

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). Best Evidence Synthesis Iterations (BES) on Professional Learning and Development. Wellington, New Zealand: Ministry of Education, 1-344.

Van der Meij, H. & Carroll, J. M. (1998). Principles and heuristics for designing minimalist instruction. In J. M. Carroll (Ed.). *Minimalism beyond the Nurnberg Funnel* (pp. 19 -53). Cambridge, Mass: MIT Press.

Van Veen, K.. & Sleegers, P. (2006). How does it feel? Teachers' emotions in a context of change. *Journal of Curriculum Studies, 38*(1), 1-27. doi: 10.1080/00220270500109304

Van Veen, K., Sleegers, P., & van de Ven, P. (2005). One teachers' identity, emotions and commitment to change: A case study into the cognitive-affective processes of a secondary school teacher in the context of reforms. *Teaching and Teacher Education, 21*, 1-18. doi:10.1016/j.tate.2005.06.004

Verloop, N. (2003). De leraar. In N. Verloop & J. Lowyck (Eds.) *Onderwijskunde*. Groningen: Wolters Noordhoff.

Wayman, J. C., Jimerson, J. B., & Cho, V. (2012). Organizational considerations in establishing the data-informed district. *School Effectiveness and School Improvement, 23*(2), 159-178.

Yin, R. K. (2003). *Case Study Research, Design and Methods*. Thousand Oaks, CA: Sage Publications.

9. Appendices

9.1 Observation scheme

Data team methode basisonderwijs	
Begrijpelijkheid	Alle vragen noteren die door de workshopdeelnemers worden gesteld over de vocabulaire.
Bruikbaarheid (acht stappen)	Noteren in hoeverre de workshopdeelnemers werken aan de zelfstandige opdrachten van stap 2. Noteren in hoeverre de workshopdeelnemers werken aan de zelfstandige opdrachten van stappen 4-5-6. Alle vragen noteren die door de workshopdeelnemers worden gesteld over de acht stappen van de data team methode.
Leiderschap	
Aanwezigheid	Noteren of de schoolleider aanwezig is bij de workshop.
Tijd	Noteren of de schoolleider een opmerking maakt wat betreft de tijd voor data gebruik.
Datavaardigheden	Noteren in hoeverre de schoolleider werkt aan de zelfstandige opdrachten van stap 2. Noteren in hoeverre de schoolleider werkt aan de zelfstandige opdrachten van de stappen 4-5-6. Alle vragen noteren die door de schoolleider worden gesteld wat betreft datavaardigheden.

Intern begeleider	
Aanwezigheid	Noteren of de intern begeleider aanwezig is bij de workshop.
Schoolcultuur	
Gebruik van data	Noteren of de workshopdeelnemers een opmerking maken wat betreft hun mate van gebruik van data in de school.
Samenwerking	Noteren in hoeverre de workshopdeelnemers samenwerken aan de zelfstandige opdrachten van stap 2. Noteren in hoeverre de workshopdeelnemers samenwerken aan de zelfstandige opdrachten van de stappen 4-5-6.
Vertrouwen	Noteren of de workshopdeelnemers een opmerking maken wat betreft hun vertrouwen in elkaar.
Hoge verwachtingen	Noteren of er hoge verwachtingen worden uitgesproken wat betreft het gebruik van data.
Innovatieattitude	
Verplichting	Noteren of de workshopdeelnemers een opmerking maken over de verplichting om data te gebruiken in de school.
Data willen gebruiken	Noteren of de workshopdeelnemers een opmerking maken over het willen gebruik van data.
Overige	
Opvallende observatiepunten	

9.2 Focus-group interview scheme

1. Hoe hebben jullie de workshop over de data team methode gericht op het basisonderwijs ervaren?
2. Kunnen jullie beschrijven wat de data team methode inhoudt?
3. Wat is jullie mening over de data team methode gericht op het basisonderwijs?
4. Wat heeft de school nodig om de data team methode succesvol in te voeren?
5. Wat zou het invoeren van de data team methode kunnen hinderen?
6. Welke bevorderende eigenschappen heeft de school voor het invoeren van de data team methode?
7. Wat vinden jullie van de inhoud van de data team methode?

- *Begrijpen jullie de inhoud?*
- *Wat vinden jullie van de gebruikte vocabulaire?*

8. Wat vinden jullie van de bruikbaarheid van de data team methode?

- *Wat vinden jullie van de werkbaarheid van de acht stappen van de data team procedure?*
- *In hoeverre is de benodigde informatie snel terug te vinden in de data team methode?*

9. In hoeverre zien jullie een meerwaarde van de data team methode?

9.3 Individual interview scheme

Algemeen

1. Kunt u kort vertellen over uw loopbaan hier op school?

a. Hoe lang bent u al werkzaam in het onderwijs?

b. Wat is uw huidige functie binnen de school?

c. Heeft u eerder deelgenomen aan trajecten rondom opbrengstgericht werken?

- *Waarom wel/niet?*
- *Wat was dat voor traject?*
- *Had u het gevoel dat het meerwaarde had? Waarom wel/niet?*
- *Wat vindt u van vernieuwingen binnen de school?*

Data team

2. Kunt u beschrijven hoe u betrokken bent geraakt bij de workshop over de data team methode?

- *Wat dacht u toen u benaderd werd?*
- *Wat waren uw verwachtingen en kwamen die overeen met de werkelijkheid?*

Data team methode

3. Wat is uw mening over de data team methode gericht op het basisonderwijs?

a. Kunt u beschrijven wat de data team methode inhoudt?

De map van de data team methode wordt aan de leerkracht, intern begeleider of schoolleider gegeven zodat men deze kan bestuderen. De volgende vragen worden over de map gesteld:

b. Wat vindt u van de inhoud van de data team methode?

- *Begrijpt u de inhoud?*
- *Wat vindt u van de gebruikte vocabulaire?*

c. Wat vindt u van de bruikbaarheid van de data team methode?

- *Wat vindt u van de werkbaarheid van de acht stappen van de data team procedure?*
- *In hoeverre is de benodigde informatie snel terug te vinden in de data team methode?*

d. In hoeverre ziet u een meerwaarde van de data team methode?

Factoren

4. Wat heeft de school nodig om de data team methode succesvol in te voeren?

- *Wat zou het invoeren van de data team methode kunnen hinderen?*
- *Welke bevorderende eigenschappen heeft de school voor het invoeren van de data team methode?*

Indien tijdens de beantwoording van vraag 4 niet alle hieronder genoemde factoren aan bod zijn gekomen, wordt het interview vervolgd door de respondent te bevragen naar de hieronder genoemde factoren.

Factoren

Leiderschap:

5. Hoe heeft u de rol van de schoolleider tijdens de workshop ervaren?

a. Stel dat uw school met een data team gaat werken, wat zou volgens u dan de rol van de schoolleider hierin moeten zijn?

b. Welke rol speelt de schoolleider bij opbrengstgericht werken?

Intern Begeleider:

6. In hoeverre heeft u behoefte aan ondersteuning van de intern begeleider op het gebied van opbrengstgericht werken?

- *In hoeverre wordt u voorzien in training en ondersteuning van de intern begeleider op het gebied van opbrengstgericht werken?*
- *In hoeverre heeft u behoefte aan training en ondersteuning van de intern begeleider in het gebruik van de data team methode?*

a. Kunt u beschrijven wat de rol van de intern begeleider in de school is?

Schoolcultuur:

7. In hoeverre wordt er in de school gebruik gemaakt van data voor het maken van beslissingen?

- *Kunt u vertellen hoe u data gebruikt?*
- *In hoeverre wordt u getraind in het gebruik van data?*

a. Welke rol speelt de schoolleider in de mate van gebruik van data binnen de school?

- *In hoeverre wordt er samengewerkt tussen leerkrachten en de schoolleider?*
- *Hoe wordt het vertrouwen tussen leerkrachten en de schoolleider gestimuleerd?*
- *In hoeverre spreekt de schoolleider hoge verwachtingen uit tegenover de leerkrachten?*

Innovatie attitude:

8. In hoeverre waardeert u het gebruik van data?

- *Kunt u uw emotie(s) beschrijven wat betreft het gebruik van data?*
- *In hoeverre wilt u data gebruiken om onderwijs te verbeteren?*
- *In hoeverre wordt u verplicht om data te gebruiken?*

9.4 Code scheme

Coding theme	Subcode	Indicators
Data team method	Opinion	Opinions of the participants about the data team method. Comments of the participants about their experiences with the workshop about the data team method.
	Description	Description of the data team method given by the participants.
	Comprehensibility	Comments about the content of the data team method. Comments about the used vocabulary related to the data team method.
	Usefulness	Comments about the use of the eight steps of the data team method. Description of whether the participants work on the assignment of step 2 (formulating hypotheses) of the data team method. Description of whether the participants work on the assignment of steps 4-5-6 (data quality check, data analysis, interpretation and conclusions) of the data team method.
	Questions	Questions about the trajectory of the data team method in primary and secondary education.
	Added value	Description about the added value of the data team method.
	Needs	Comments about important characteristics of schools for the implementation of the data team method.
	Hinder	Comments about hindering factors for the implementation of the data team method.
Leadership	Presence SL	The school leader is present at the workshop.
	Role SL	Description of the role of the school leader in the team during the workshop about the data team method. Description of the role of the school leader if the school will use the data team method.
	Data literacy SL	Comments with regard to the school leader's knowledge about data and the school leaders' use of data in the school. Description of whether the school leader works on the assignment of step 2 (formulating hypotheses) of the data team method. Description of whether the school leader works on the assignment of steps 4-5-6 (data quality check, data analysis, interpretation and conclusions) of the data team method.

Data expert	Presence DE	The data expert is present at the workshop.
	Role DE	Description of the role of the data expert in the school. Comments of the participants about whether they want support from the data expert in data-based decision making. Comments of the participants about whether they are provided with support from the data expert in data-based decision making. Comments of the participants about whether they want support from the data expert in using the data team method.
School culture	Data use	Comments about whether the school uses data for decision making. Comments about how teachers and data experts use data. Comments of the participants about whether they get trained in using data.
	Collaboration	Description of whether the participants collaborate when working on the assignments of step 2 (formulating hypotheses) and steps 4-5-6 (data quality check, data analysis, interpretation and conclusions). Comments about whether the school leader, data expert and teachers collaborate.
	Trust	Comments about trust between teachers, data experts and school leaders.
	Expectations	Comments about whether expectations regarding data use within the school are expressed.
	Promote	Comments about promoting factors of the school for implementing the data team method.
Innovation attitude	Emotions	Comments about emotions regarding data use in the school. Negative emotions are, for example, anger and shame. Positive emotions are, for example, enthusiasm and happiness.
	Voluntary	Comments about the obligation or the voluntariness to use data in the school.
	Data attitude	Comments about the willingness or the resistance to use data in the school.