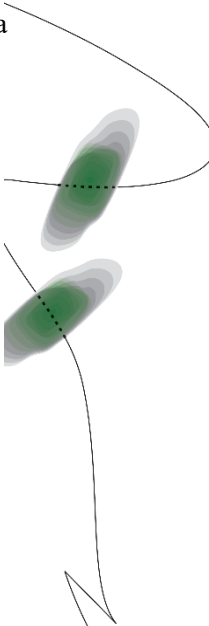
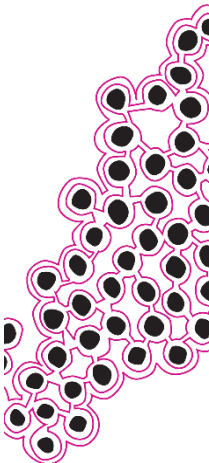


School Leadership in a school with Professional Learning Communities focused on Sustainable Data  
Use



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### **Acknowledgement**

With this, I present my master thesis, which I have worked on during the final phase of the 'Educational Science and Technology' (EST) study at the University of Twente. During my search for a stimulating subject for my master thesis, I worked as a teacher at the secondary school level. After meeting with Elske Muilenburg and Cindy Poortman, who were working on a project around leadership and sustainability in secondary schools, my interest was sparked immediately.

Throughout my extensive research, I gathered data regarding the influence of school leadership on sustainable educational interventions. The University of Twente introduced the data team intervention at this school; therefore, data could be gathered on the sustainability of professional learning communities and the influence of school leaders.

I want to thank some people who have supported me during my research. First, I'd like to acknowledge Cindy and Elske for their ideas, guidance and feedback during the process of my research. The discussions we had during our meetings were very inspirational to me. The expertise and advice they gave me helped me to improve my research.

Additionally, I would like to thank the secondary school I employed with, as they allowed me to gather the necessary data needed for my research. The staff provided me with information that was crucial to my data collection. They were very open and friendly, and I appreciate their incredible hospitality. I would also like to express my gratitude to Michelle Rodijk, a friend and former student of the EST master program, who helped me with measuring the reliability of the instruments used during the research. A sincere thanks to my family and friends who supported me, unconditionally, during the years. They gave me the trust and confidence which I needed to finish my studies. The combination of being pregnant and working towards graduating has not been easy on me, but with the help and support of the people above it was made possible.

I hope you will enjoy reading my thesis.

Marinne Kuitert,

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### Summary

Research suggests that well-developed professional learning communities (PLCs) have a positive impact on both teaching practices and student achievement. However, it seems to be challenging for PLCs to realize sustainable school improvement. Effective school leadership is crucial to support PLCs and to realize sustainability. Despite these insights, it is still unclear what the exact role of leadership is in terms of school leaders' core functions and tasks. Therefore, this study aims to give more in-depth information into school leadership in a school that focuses on sustainable school improvement by PLCs for almost three years and will continue to do so. This qualitative research aims to answer the following research question: *What does school leadership look like in a secondary school in the Netherlands with PLCs focused on sustainable data use?*

To study this, observational data and interview data were collected. Observational data was gathered by shadowing the school. Insight was gained into the daily life of formal leaders, informal leaders and teachers. Also, (PLC) meetings were observed. In addition, interview data was gathered by conducting semi-structured interviews. The data was transcribed, structured and coded on the basis of a coding scheme.

The results showed that PLCs within this school are less sustainable than desirable. For example, knowledge gained within and on PLCs is hardly shared throughout the school. However, there were also school leader tasks observed that result in sustainable data use, like creating a safe environment for staff to work in. The results can be helpful to support school leaders in sustaining improvement by PLCs.

This study found that schools using data teams for sustainable school improvement should use a bottom-up approach when it comes to setting a vision and setting goals. Also, school leaders should emphasize effective communication and make sure knowledge is shared throughout the entire school. In addition, it is recommended to introduce decision-making committees as teacher empowerment enhances teachers' self-esteem and work satisfaction.

For future research it would be interesting to compare observed leadership activities, tasks and behaviour in schools with sustainable PLCs and schools with PLC that are less sustainable. Specifically, comparative research can be carried out within schools that make use of decision-making committees and schools that do not, schools that master knowledge brokerage and schools that do not master knowledge brokerage and last, schools using a bottom-up approach and school using a top-down approach.

## **Introduction**

In today's changing and increasingly complex world, school communities need to work and learn together in order to be successful (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). In professional learning communities (PLCs), teachers and school leaders work together for the benefit of professionalisation and educational improvement (Van Veen, Zwart, Meirink, & Verloop, 2010). In these communities, a group of teachers and school leaders try to improve teachers' knowledge and skills and therefore indirectly have a positive impact on student learning by regularly sharing their knowledge and experiences around a theme that is relevant for them (Bruns & Bruggink, 2016).

Within a school environment, PLCs are found to enhance student achievement (Lomos, Hofman, & Bosker, 2011) and to result in schools that are constantly learning and thus changing (Kilbane, 2009). Since PLCs are found to be effective, it is highly preferable that PLCs will continue when support is withdrawn (Fullan, 2007). However, it seems to be challenging for PLCs to realize sustainable educational improvement (Dufour, 2004; Hubers, 2016), and spread improvements throughout the whole educational system (Stoll et al., 2006).

It is complicated to make the work in a PLC a part of the daily work of teachers (Van Veen et al., 2010). This can be due to school-organizational boundary conditions, such as time for teachers to develop themselves. For example, most of the workload of teachers exists of teaching time and time around it to prepare lessons and to spend time on other student-related tasks. Remaining time is often scarce, but also reserved time for professionalisation often is planned at moments that are not ideal to learn (Van Veen et al., 2010). Besides, in general, schools have a culture and structure where teacher professionalisation is not a first priority, simply because the primary process of the school is to teach students (Van Veen et al., 2010).

To sustain improvements implemented by PLCs, teachers and school leaders should work closely together (Moolenaar, Daly, & Slegers, 2010). There is evidence that effective leaders have an indirect but powerful influence on student achievement (Muijs & Harris, 2003) and that the role of a school leader is crucial in achieving sustainable school improvements (Harris & Jones, 2010). Additionally, research revealed that integrated leadership plays an important role in sustaining successful educational improvements (Robinson, Lloyd, & Rowe, 2008). Despite these insights, it is still unclear what the exact role of leadership is in terms of activities, competencies and organizational structures. This study aims to give more in-depth information into school leadership in a school which has implemented data use PLCs for sustainable school improvements.

This case study is conducted using a qualitative approach in order to get more in-depth knowledge into school leadership in a school that aims to realize sustainable school improvements by PLC(s). Observational data was gathered in October 2018 by shadowing a school that implemented a specific type of PLC and by gathering interview data from different school leaders. This resulted in recommendations about effective school leadership when implementing PLCs focused on sustainable school improvement.



## Research Question

This research aims to answer the following question: *What does school leadership look like in a secondary school in the Netherlands with a PLC focused on sustainable data use?* In order to gain in-depth insights in school leadership in a school with data use PLCs focused on sustainable school improvement, this study was conducted using a qualitative approach. In this case study, first the literature was studied on the aspects of school leadership in sustainable school improvement. School leadership was studied in-depth in one case that has worked with data teams for almost three years and will continue to do so. Observations were conducted to increase the validity of this research (Baarda et al., 2015) and semi-structured interviews were collected to gain in-depth views, because questions could be adjusted to individual situations or adjusted to questions that arose after observing (Baarda et al., 2015).

## Organizational Context

This research was conducted in a secondary school in the south of the Netherlands. The school offers education for different departments: bilingual pre-university education, pre-university education, higher general secondary education and preparatory secondary vocational education. The school started with a new head of education after a merger of two schools from two different villages in 2009. Since then, the management consists of the head of education, two sector directors (one for preparatory secondary vocational education and one for pre-university education and higher general secondary education) and an administrative director. The members of the management are supported by team leaders. Team leaders are leaders of a department consisting of specific annual layers who manage a team of teachers within this department.

In 2018, the school counted 1.465 students. The school is a part of a larger school community, consisting of 11 schools and a total of 6.338 students. The school tries to distinguish itself from other schools in the neighbourhood by, among other things, offering bilingual education, a transition class, a plus program and a science lab. Also, the school is very active in internationalization for students.

## Exploration and Definition of the Research Problem

### Professional Learning Communities

Teacher professionalisation is seen as one of the essential means to improve the quality of education (Robinson et al., 2008). It has great impact on the processes and activities that are explicitly designed to improve knowledge and attitudes of teachers which indirectly will improve student outcomes (Vescio, Ross, & Adams, 2008; Van Veen et al., 2010). Teacher professionalisation can be achieved by the intervention of a PLC (Fullan, 2015; Lomos et al., 2011; Stoll et al., 2006; Vescio et al., 2008).

In the literature there are many definitions of the concept PLC. However, in their review of 2006, Stoll et al. found that there is consensus that suggests that a PLC is a group of people “who

share their practice and ask critical questions at a continuing, reflective, cooperating, comprehensive, learning-oriented and growth promoting way, operating as a collective” (Stoll et al., 2006, p. 223). Another example is the definition of PLCs by Bruns and Bruggink (2016): “Learning communities usually exist of 6-12 teachers (and teacher leaders), who regularly come together to share their knowledge and experiences in a structured way around a theme that is relevant for them. The new insights can be implemented immediately to improve education” (Bruns & Bruggink, 2016, p. 11).

In this study, the focus is on data teams as a type of PLC and a combination of the definitions of PLCs of Stoll et al. (2006) and Bruns and Bruggink (2016) will be used as this applies to the composition of the data teams at the school where data is collected:

*A professional learning community is a group of teachers and school leaders that try to improve teachers' knowledge and skills and therefore indirectly has a positive impact on student learning. PLCs regularly share their knowledge and experiences around a theme that is relevant for them and ask critical questions at a continuing, reflective, cooperating, comprehensive, learning-oriented and growth promoting way, operating as a collective.*

### **Data Use in Professional Learning Communities**

In this research we focus on data teams as a specific type of PLCs. Data teams try to improve decision making within a school by using important data for educational decision making (Schildkamp, Poortman, & Handelzalts, 2016). Important data can be both qualitative or quantitative, as long as it is collected systematically and organized to represent some aspects of school (Schildkamp & Lai, 2013). Effective data use can help increase student achievement (McNaughton, Lai, & Hsiao, 2012). However, schools often do not use data in their decision-making processes or use data ineffectively (Schildkamp & Lai, 2013). Decisions are regularly based on intuition and limited observations only (Ingram, Louis, & Schroeder, 2004).

In the data team intervention, teams existing of six to eight educators in secondary schools learn how to use data to solve educational problems that school face (e.g., high rates on grade repetition) (Schildkamp et al., 2016). The data team intervention concentrates on two goals: the professional development of data team members and school improvement by solving educational problems, such as poor final examination results in a particular course. Solving educational problems entails increasing colleagues' level of data use and consequently leads to the need of knowledge brokering (Hubers et al., 2018) which will be discussed later on in this literature review.

### **Educational Leadership**

Research suggests that the role of a school leader is of great importance in achieving sustainable school improvement (Harris & Jones, 2010; Muijs & Harris, 2003). There is evidence that school leaders can have an indirect but significant influence on student outcomes (Muijs & Harris, 2003; Leithwood, Harris & Hopkins, 2008), if they have enough support to make important decisions and if the main responsibilities are well defined and focus on teaching and learning (Pont, Nusche & Moorman, 2008). At the same time, it appears that not only the responsible school leaders are of great

importance for sustainable school improvement, but also the extent to which other stakeholders, such as teacher leaders and teachers, develop their leadership potentials and skills (Moolenaar et al., 2010).

School autonomy can be defined as the decentralisation of decision-making power to improve student performance through a formal governance structure which allows local decision-making. According to the results of OECD (2007a), increased school autonomy can play a positive role in the implementation of educational interventions and provision of leadership for improved learning. In many countries, such as The Netherlands, school leaders have a high degree of autonomy in different areas of decision making. However, effective school autonomy requires support. Educational leaders need time and capacity to engage in the core practices of leadership and therefore should distribute leadership throughout the entire school. This is indicated by the term ‘distributed leadership’ (Spillane, Halverson & Diamond, 2001). Research shows a positive relation between distributed leadership and changes in schools (Harris, 2009). Stoll and Louis (2007) even identified DL as a key influence to sustaining PLCs. DL focuses on interactions between leaders, followers and the situation and encompasses both formal and informal forms of leadership practices. Within PLCs, leadership should be widely distributed and therefore can make a significant difference to student achievement. Therefore, when studying school leadership, the entire school management must be studied.

Furthermore, organizational structures of a school must be investigated (Hendriks & Scheerens, 2013). This is indicated by the term ‘integrated leadership’. Studying integrated school leadership entails the structural characteristics of a school organization, and the distribution of coordination and leadership tasks among people (Hendriks & Scheerens, 2013). Organizational routines are an aspect of the school’s formal organizational structure. One of the main purposes of an organizational routine is to efficiently coordinate action among organizational members. Also, they can help to reduce conflicts about how to do organizational work (Spillane, 2012) as different actors can have either a formal and/or informal leadership function and every actor within a school organization can show leadership behaviour (Harris & Jones, 2010).

In order to study school leadership, this study will focus on a set of three core functions of school leadership. These three broad groups of interrelated leadership functions have been identified as associated with improved student outcomes. Within this set of functions, school leaders are supposed to manage the teaching and learning program, to organize and (re-)design the organization and to understand and help develop people. The core functions and corresponding tasks are a combination of the leadership dimensions that have an impact on student outcomes as used by Robinson et al. (2008) and of investigated leadership skills in an overview of the literature by Leithwood et al. (2008). Each of the core functions of school leadership is related to four corresponding tasks as shown in Table 1. The core functions of school leadership and their corresponding tasks will be discussed below.

Table 1

*School Leaders' Core Functions and Tasks*

Managing the teaching and learning program	Organizing and (re-)designing the organization	Understanding and developing people
Planning curriculum and instruction	Developing vision	Individual support
Monitoring curriculum and instruction	Developing goals	Coaching teachers
Coordinating curriculum and instruction	Strategic resourcing	Modeling
Evaluating curriculum and instruction	Creating climate	Empowering teachers

**Managing the teaching and learning program.** The first core function of a school leader aims to create productive working conditions for teachers by fostering organisational stability and strengthening the school's infrastructure. Specific tasks are planning, monitoring, coordinating and evaluating the curriculum and instruction.

**Planning.** In the Netherlands, schools have a high degree of responsibility in decision making related to curricular issues. For example, they have to determine course content, decide which courses are offered and choose textbooks. School leaders need to decide how they design the curriculum content and sequence, and how to organize teaching and instructional resources. Marzano, Waters, & McNulty (2005) list the importance of school leaders' direct involvement in design and implementation. In their research, they found that schools where school leaders were directly involved in design and implementation scored higher on standardized assessments than schools where school leaders were less directly involved.

**Monitoring.** It is important for school leaders to develop and review goals, by determining school performance along different indicators. This asks skills from school leaders for collecting and understanding information by research and reflection. School leaders should encourage teachers to systematically gather and review evidence. Additionally, they should ask effective and critical questions about performance (Leithwood & Riehl, 2003).

Also, school leaders should monitor and adjust the structural organization of the school. Effective structures can enhance individual performance and the accomplishment of goals. It includes task assignment, the use of time and space, the acquisition and allocation of equipment, supplies, and other resources, and all of the routine operating procedures of the school (Leithwood & Riehl, 2003).

***Coordinating curriculum and instruction.*** Robinson et al. (2008) showed that higher performing schools spend more time on coordinating the curriculum with their teaching staff than leaders in similar lower performing schools. School-wide-coordination across classes and year levels and alignment to school goals also has a positive influence on student achievement.

***Evaluating curriculum and instruction.*** Effective school leaders ask critical questions, emphasize the use of systematic data use, and encourage monitoring of teaching and student progress (Robinson et al., 2008). Evaluation can be carried out as a part of larger quality review or school improvement process (Pont et al., 2008). In order to evaluate school improvement, different data can be used, such as data on student performance or teacher performance. In order to evaluate individual teachers, school leaders can rely on teachers' classroom observations or other data, such as peer review, teacher self-evaluation, measures of student performance or teachers' plans. However, research suggest that school leaders often do not have enough time and/or capacity to focus on teacher evaluation (Pont et al., 2008).

***Organizing and (re-)designing the organization.*** This core function aims to establish work conditions which allow teachers to be involved in the development of school goals and vision. Within this category, the focus is on developing goals and a vision, strategic resourcing and creating climate in order to motivate and inspire teachers and to clarify roles and objectives (Leithwood et al., 2008).

***Developing vision.*** Effective leaders help their schools to develop a vision that embodies the best thinking about teaching and learning (Leithwood & Riehl, 2003). They should create shared meanings and understandings about students, learning and schooling to support the school's vision, since people commonly base their actions on how they understand things (Leithwood, 2013). School leaders also need to convey their expectations for quality and high performance and help others see the challenging nature of the goals being pursued. This all needs to be embedded in school and classroom routines to have the greatest impact on student outcomes (Leithwood & Day, 2007; Robinson et al., 2008).

Developing a vision in a school can be done in either a top-down approach or a bottom-up approach. In schools using a top-down approach, the vision will be set by the school leaders or head of the school, whereas schools using a bottom-up approach allow teachers to be more involved in the creation of a common-school vision (Cruickshank, 2017). It is of great importance for successful leadership that different actors in a school are involved in and shape school improvements (Muijs & Harris, 2003). Therefore, school leaders could work on a transformational level. Transformational leadership results in teacher empowerment, multiple stakeholder participants in school decisions, and reduced support for top-down theories. It raises values of members and motivates them to go beyond self-interest to embrace organizational goals (Robinson et al., 2008). It also contributes to organizational citizenship, which refers to an individual's willingness to go beyond the formal requirements of the job to engage in productive functions to enhance organizational effectiveness (Nguni, Slegers & Denessen, 2006).

***Developing goals.*** In an analysis of Robinson et al. (2008) evidence was found for the importance of setting goals and expectations. As mentioned in the paragraph above, visions can be set in a top-down approach or in a bottom-up approach. The same applies for setting goals. Due to the engagement when using a bottom-up approach, teachers will be more intrinsically motivated to achieve goals (Cruickshank, 2017). School leaders who tend to flatten the school hierarchy and make teachers think along about school goals and improvement plans realize a better teacher commitment (Ross & Gray, 2006).

To be successful, school leaders should focus their staff on student improvement and make achieving goals a key focus of everyday practices and procedures. It is the task of an educational leader to make sure that stakeholders' personal goals and school goals are one and the same in order to foster the acceptance of group goals. PLCs emphasize the importance of shared goals and effort as groups of teachers and teacher leaders work on common goals (Leithwood & Riehl, 2003).

Heck, Marcoulides, & Lang (1991) found that school leaders in higher performing schools tend to give more emphasis to communicating both school vision and goals. Therefore, school leaders need an ability to communicate the goals for their school and they need to do it in a way that engages other stakeholders (Mulford et al., 2009). Leaders best succeed in communicating with their staff, when they occupy a position close to their teachers (Moolenaar et al., 2010). Information will reach all team members quicker and with more ease without information being modified. This close position to teachers is also demonstrated in teachers' search for personal advice from school leaders. Therefore, also a psychologically safe environment is needed which will be discussed later on as one of the tasks of a school leader.

***Strategic resourcing.*** Strategic resourcing involves aligning resource selection and allocation to priority teaching goals and it includes provision of appropriate expertise through staff recruitment (Robinson et al., 2008). Studies indicate that learning is primarily influenced by setting ambitious goals and establishing conditions that support teachers (Leithwood & Riehl, 2003). Leaders should ensure that resources and processes are in place to empower teachers to teach well (Leithwood, 2013). Strategic resourcing is key to all activities within the school on improving teaching and learning (Pont et al., 2008).

***Creating climate.*** For innovation to occur, the climate in a school is of great importance (Moolenaar et al., 2010). In order to create a psychologically safe environment to work in, there need to be openness in communication within the school and staff need to have the feeling that they will have the possibility to take risks when working on innovations (Moolenaar et al., 2010). Therefore, school leaders need to develop school cultures that embody shared norms, values, beliefs and attitude that promote mutual caring and trust among all staff (Leithwood & Riehl, 2003). Leithwood et al. (2008) adds that trust among teachers and fostering continuous dialogue among school staff is of particular importance within PLCs.

Although teaching often takes place behind closed classroom doors, a lot of research suggests that teaching should be collegial and transparent, cooperative and collaborative and that it should be conducted in teams and PLCs (Stoll & Louis, 2007). Therefore, school leaders should also promote collaborative working cultures. Collaborative working cultures involve fostering teamwork among teachers and creating environments in which student learning is the central focus. Teachers need to be provided with resources to support collaboration (Leithwood et al., 2008).

Furthermore, Hubers et al. (2018) underlined the importance of sharing knowledge gained in PLCs throughout the whole school. As mentioned before, solving educational problems entails increasing colleague's level of data use and consequently leads to the need of knowledge brokerage. Knowledge brokerage arises when knowledge is shared beyond the team to build capacity within the entire school. It makes data more accessible and subsequently is likely to facilitate school staff's communication about data use and the issues those data indicate to be important. In addition, sharing knowledge affects the sustainability of interventions (Lachat & Smith, 2005).

There are different types of knowledge that can be shared or brokered: first of all, there is knowledge on data use and second there is knowledge on the educational problem. When we want knowledge to be used as a tool to build capacity, knowledge needs to be brokered (Ward, House, & Hamer, 2009).

**Understanding and developing people.** The idea of this category is not only to build on the knowledge and skills that teachers and other staff need to master in order to accomplish goals, but also the disposition (commitment, capacity and resilience) to persist in applying the knowledge and skills. The practices for school leaders in this category are providing individual support, coaching teachers, modelling and empowering teachers.

**Individual support.** Educational leadership also plays an important role in promoting and participating in professional learning and development of teachers. According to Robinson et al. (2008) this is most strongly associated with improved student outcomes. School leaders improve teaching and learning indirectly and most powerfully through their influence on staff motivation, commitment and working conditions (Leithwood et al., 2008).

Staff motivation can be reached by enabling staff to understand and gain mastery while they are allowed to make mistakes (Leithwood & Riel, 2003). Also, leadership practices should recognize and reward individual accomplishment and it should demonstrate awareness of personal aspects of staff (Marzano et al., 2005). School leaders need to show respect for staff and should concern about their feelings and needs (Leithwood et al., 2006). Staff motivation indirectly also leads to commitment among teachers. In order to create even more commitment among teachers, intellectual stimulation should be offered and reflection should be encouraged. Staff needs to be challenged to examine assumptions about their work and rethink how it can be performed better.

Last, school leaders can support teachers individually by offering appropriate working conditions. They should provide information and resources to make people reflect on their own

practices and they should ensure that the professional development is relevant to the school context and with teachers' needs. Therefore, school leaders should plan professional development activities and provide opportunities for staff development (Pont et al., 2008).

***Coaching teachers.*** School leaders need to help create conditions for professional growth and provide instructional guidance (Leithwood & Riel, 2003). In their research, Louis, Dretzke, & Wahlstrom (2010) found that school leaders should visit classrooms that involves direct recommendation or advice about change in instruction. During these visits, the quality of teachers will be observed. Also teachers can be stimulated to visit each other's classroom and give feedback to one another. However, teacher-on-teacher relationships are strongly affected by trust between teachers (Louis et al., 2010). When introducing peer-coaching, school leaders need to ensure there is trust among teachers.

***Modeling.*** Successful educational leaders set examples for staff to follow that are consistent with the school's vision and goals. It enhances others' beliefs about their own capacities and their enthusiasm for change (Leithwood & Riehl, 2003). For instance, school leaders should set examples for teachers to follow in using data for evaluation when teachers are expected to use data in PLCs. School leaders should not rely on their gut feeling alone, but use data to track down the real problem.

***Empowering teachers.*** Studies about educational leadership found that authority to lead need not be located in the person of the leader but can be distributed within the school and among people (Harris, 2002). Distributed leadership can be achieved by using a bottom-up approach. Therefore, leadership is a function more than a role. Although school leaders are often invested in persons in formal roles, informal leaders have great impact on student achievement as well. For example, teachers can be informal leaders without a formal leadership role such as planning, communicating goals, regulating activities and creating a safe work environment, or formal leaders in roles such as head of department, coordinator of a special program, or teacher mentor. Educational leaders are those persons who provide direction and exert influence in order to achieve school's goals.

Functions are depending on the individual leader, the context, and the nature of the goals being pursued (Leithwood & Riehl, 2003). Empowering teachers to take on leadership roles enhances teachers' self-esteem and work satisfaction and in turn will lead to higher levels of performance (Katzenmeyer & Moller, 2001). One way for teachers to take part in important decision-making in school is by being part of a PLC. Therefore, school leaders could provide autonomy for teachers, to allow them to manage their own decision-making committees and to take staff opinion into account. Additionally, effective group problem solving during meetings of staff must be ensured and working conditions so that staff have collaborative planning time needs to be altered (Leithwood & Jantzi, 1999).

### **Sustainability**

Since PLCs are found to be effective, it is highly preferable that PLCs will continue when support is withdrawn (Fullan, 2007). However, educators internationally face major challenges in



spreading improvements throughout the whole school system and in trying to sustain improvements over time (Stoll et al., 2006).

Just like for PLCs, in the literature there are many different definitions to be found for sustainability. However, the following is mentioned in different definitions: Sustainability is achieved when a) the intervention is an ongoing process even when external support is withdrawn (Fullan, 2006; Coburn, Russell, Kaufman & Stein, 2012) and b) it happens during regular work without causing interruption in daily practice throughout the school (Hargreaves, 2003; Fullan, 2007; Coburn & Turner, 2012).

For data teams, this means that sustainability is achieved when the way of working is embedded in the way of working in existing network structures within the school and when it is continuously adapted to the needs of the school. Therefore, it is important that PLCs develop knowledge about the renewal in question, but they also need to share this within their entire network, to make sure it will be implemented throughout the school. (Coburn, Touré & Yamashita, 2009).

### **Research Approach**

This research is part of a larger study into the role of school leadership in sustainable educational improvements by PLCs. The researcher conducting this larger study has arranged for an observation period of six weeks within the school, during which data collection for the study in this research also takes place. In this section the research design of this study is discussed, including methods that will be used, respondents, instruments, the procedure and data analysis.

### **Research Design**

In order to gain insights into what school leadership looks like in a school with PLCs focused on sustainable school improvement, this study is conducted using a qualitative approach. First, observational data was gathered during four days by shadowing on a secondary school that introduced data teams in October 2015 and is still working with data teams. Shadowing increased the validity of this research (Creswell, 2007). Second, interview data was gathered to deepen the findings. Semi-structured interviews were conducted with three teachers and/or school leaders, selected based on questions arising from the observations (Baarda et al., 2015).

### **Respondents**

The respondents were all teachers and school leaders in the data team school. We walked along with formal leaders, observed (PLC-) meetings and walked along with informal leaders as well. Additionally, three employees were asked for an interview based on questions that emerged during the shadowing process. They were asked for approval for the interviews.

### **Instrumentation**

**Observations.** First, observational data was gathered by shadowing in a secondary school. Shadowing is an intensive form of data collection which will increase the validity of this study. While

shadowing, the researcher follows an individual in their daily work and makes field notes of everyday activities, behaviours, conversations, and the setting in which individuals find themselves. Although the emphasis is on shadows, the researcher can also have informal conversations during shadow days to find out the meaning of the followed individuals: how, for example, do managers experience certain events or interactions with others? By referring back to conversations or events that have just taken place, it is possible to interview 'in context'. This has the important advantage that the answers to the interview questions are less abstract and are based on concrete experiences (Noordegraaf, 2014). All fieldnotes have been written in log books in order to structure the data and make it easier to draw conclusions. The log book uses the core responsibilities and tasks of school leaders as used in Table 1.

**Interviews.** This study used semi-structured interviews to gain in-depth views in what leadership looks like in a school that uses data teams to sustain educational improvements. Semi-structured interviews were appropriate in this research, since there was a small number of respondents that has been interviewed and because questions could be adjusted to the individual situation (Baarda et al., 2015). The interviews were a supplement of the information gathered in the shadowing process and served to deepen the findings.

Three semi-structured interviews have been conducted with employees that were involved in data teams. The interviews used a list of topics and started with one starting question. The questions that followed the starting questions were adjusted to the answers of the interviewee. The questions were based on the operationalization of the constructs leadership, sustainability and PLCs. They aimed to give an answer on the questions that emerged during the shadowing process. The items were tested during a pilot. In this pilot, teachers and school leaders on a different secondary school were asked to give feedback to the questions, to find flaws in the items and to test setting and time duration of the interview. The interview questions have been adjusted according to the findings of the pilot and can be found in Appendix B. Recordings of the interviews were made during interviewing. All selected participants were asked for permission and agreed for audio-recordings.

**Procedure.** The ethics commission of the University of Twente was asked for approval for gathering data in this study. Additionally, the respondents were asked for consent before conducting and recording the semi-structured interviews and they were informed about the purpose of the study.

The interviews are conducted at the location of the school, during school hours. The maximum duration of the interviews was one hour and has been voice recorded. In a formal setting, there was one interviewer and one interviewee during the interview. After the interview, the interviewee was able to ask questions about the interview and/or the study and was offered the possibility to read the final report.

### **Data Analysis**

Interview data and observational data has been analysed using the following approach: First, the audio recordings have been transcribed for the interviews in Word. Second, the transcriptions and observational data have been organized and structured. Therefore, the program 'Atlas.ti' was used.

Then, the data has been coded on the basis of a code book. The code book consists of codes, categories and descriptions of the constructs leadership and sustainability in order to establish connection and patterns. The code book was tested and adjusted according to the findings. The inter-rater reliability has been established by having a second person independently coding 10-20% of the data and subsequently comparing the results. The inter-rater reliability is calculated using Cohens' Kappa. During the first coding test, an agreement of .576 was achieved ( $\kappa = .576$ ), which is a moderate level of agreement. Two terms were often mixed up, namely "staff can take risk" and "allow teachers to make mistakes". They were difficult to distinguish and therefore merged into one code: 'staff can take risks'. In addition, the code "sensing people" has been removed. Thereafter, Cohen's Kappa was recalculated and found to be substantial with an agreement of .6287 ( $\kappa = .6287$ ).

Final coding has started when all data was gathered. For example, the information about climate has been extracted from the transcriptions. This way, reoccurring themes are established. Last, the inquiry of the themes are used in order to answer the research question.

## Results

### Sustainability

Since 2016, the secondary school where this research was conducted deployed four data teams, of which three received external support. The head of education, the two sector directors and the team leaders, from now on referred to as the school management, considers it to be important to continue the data teams when external support is withdrawn. Therefore, the management has opted for a school-wide data team which does not receive external support. However, these data team members have been part of previous data teams in which they have been supported by an external organization, hence knowing the process of a data team. Though they are familiar with data teams, multiple teachers explained when facilitation stops, motivation is lost to continue this way of working for it takes a lot of time. Therefore, the intervention cannot be seen as an ongoing process when external support is withdrawn.

Also, using data is not systematically embedded yet, except for data teams that are facilitated for it at the moment. Only a single teacher reports that he knows how to embed the use of data for his own teaching practices. Additionally, many teachers have not been involved in data teams at all. PLCs are not embedded in the way of working in existing network structures within the school. Multiple staff members of different positions, are not able to explain what data teams are and how they are used within the school. Knowledge gained in PLCs is not shared within the entire networks.

### Managing the Teaching and Learning Program

**Planning curriculum and instruction.** Concerning decision making on which courses are offered, this research showed that the management determines how many hours will be spent on each course and project per grade and level. If, for example, departments think they need more time to work

on their curriculum, they can discuss this with the management. The management takes the final decision. Substantive decisions about the curriculum are then mainly made within the departments.

With regard to determining course content, this research showed that the departments are responsible for the content of lessons, the tests and instruction. For example, the textbooks that are used in courses are selected by members of the departments, sometimes even without input of the head of department.

Within data teams, curriculum, tests and methods are also being reviewed. For example, the data team within the department of mathematics found that the focus on their curriculum should be elsewhere. Therefore, the data team had to redesign their method. Both the head of department and mathematic teachers worked on it to achieve a different focus.

**Monitoring curriculum and instruction.** Regarding asking critical questions about performance, the data showed that the school receives a visit from the school inspection every four years and the management sees this as a great opportunity to receive feedback and improve their school results. The management has been told that their education is of good quality, but students who fail should be monitored on a higher level. Immediately, the management anticipated by setting up a questionnaire that measures such matters.

With regard to collecting information by research and reflection, the staff in this school works structurally on gathering information by research and reflection as they schedule recurring meetings. Reflection happens both at the management and the teacher level. The management stimulates teachers to reflect on their own action by looking critically at student performance. For example, the mathematics department who scored an average of 10% difference between school exams and central exams, got the task of the management to perform an analysis within their department to find out where this difference came from. Afterwards, the mathematics department and the management made a plan of action. In addition, the management also requires the data teams to use structural data on specific topics in order to improve curriculum.

Concerning monitoring and adjusting the structural organization, this research investigated the deployment of four data teams over a period of three years and found the data teams to be composed in different ways. The first data team was a data team within the department of Dutch language, followed by a data team within the department of English language and a data team within the department of mathematics. Last year, a school wide data team was added. The first data team was composed by having the management asking the head of department to take part together with more English teachers who could contribute to school developments or who could flourish of taking part in a data team. The next data teams subsequently, were composed in the same way. There has not been an application procedure.

The school wide data team was composed by approaching staff members who participated in data teams before. This data team was no longer being completely guided by an external data coach and consequently the running of this data team should be easier when deploying experienced

researchers. The sector directors prefer to have independent data teams in the future. Therefore, the school wide data team is seen as a kind of test.

The departments that have worked with data teams have different subjects on their agenda in their meetings than other departments have. The management provides an agenda for the department meetings in which the data team should be evaluated.

**Coordinating Curriculum and Instruction.** A large part of coordination takes place through fixed meetings. There are meetings within the management team, several sound boarding groups like a parent counsel, within the team, but also within the departments. Within these meetings there are formal leaders. The meetings are prepared by this formal leaders like the head of education, sector directors or head of departments and an agenda is created and serves as a guide.

The four data teams are supervised by an external data coach who comes to school for every data team meeting. Additionally, every group has its own leader. These are the people who have an official leadership role, such as sector director or head of department. The leader of the group is responsible, for example they will have to prepare meetings. This way, they try to use the valuable time of the external data coach as well as possible. The data team members are very enthusiastic about this division of roles, because they can fully focus on the content of the data team and they do not have to deal with peripheral matters.

**Evaluating curriculum and instruction.** Evaluation takes place in planned meetings, such as MT-meetings, department-meetings and team-meetings. In these meetings is discussed how certain activities went, what goes well and what needs more attention. Also, there will be recorded which activities need to be finished and by whom.

With regard to the use of data on teacher performance, this research showed that performance and assessment interviews are held in the school to measure teacher performance. Different types of data is used. Teachers must request feedback from colleagues, students and department heads who visit lessons to come to feedback.

Concerning the use of data on student performance, this research showed that within data teams the curriculum and instruction are evaluated. The school management believes that there is too much listening to the gut feeling and therefore wanted to deploy data teams. Within the data teams, there is a structural evaluation based on data on student performance, partly because this is one of the steps that data teams go through. The data teams focus on the curriculum and lesson content, but also on, for example, the transition of students from class three to class four.

However, a mathematics teacher who participated in a data team indicated that he was worried about the management stopping the facilitation for data teams. Introduced measures need to be evaluated and if necessary adjusted. According to this mathematics teacher, the management and teachers of the school fail in this evaluation.

## **Organizing and (Re-)designing the Organization**

**Developing vision and goals.** At the arrival of the new head of education the vision and mission were calibrated and established in working groups. With regard to revising school goals and vision, the school writes a new school plan every four years in which the vision and mission of the school are checked to be still current or whether they need to be adjusted. Updating starts at the management level. Afterwards, any potential proposal will be discussed in various sounding board groups, such as the participation council, a parent advisory board and a group of teachers. There are staff members of every department represented in the sounding board groups to ensure that all staff can think along.

Concerning clarity and consensus of the school goals, this research showed that the management of the school propagates one vision and mission.

The communication of mission and vision takes place via different channels. First of all, communication takes place through meetings. In addition, the staff use mail (specifically a ‘Monday mail’), an online newsletter for staff (weekly bulletin) and also a newsletter for parents and students. Work-related topics are also discussed in the corridors and in the staff room. Teachers, team leaders, but also head of departments and sector directors are involved.

With regard to a bottom-up or top-down approach, an observation shows that within a management meeting, the head of education mainly takes the lead and tells how he wants it to be done. According to one of the sector directors, the school management is responsible for the implementation of his thoughts. Many of the staff members speak positively about the head of education: he is an open and transparent man and a true connector. The door is almost always physically open.

Within departments there are different approaches for setting goals. For example, one team leader allows more thinking with the spearheads than the other. In one meeting, input is requested and in the other meeting, only a proposal is presented and permission is requested.

With respect to whole staff consensus, observations showed how different data teams each had its own approach concerning problem statements. Within data teams, a problem statement and a matching hypothesis need to be formulated by the entire data team. In order to formulate the problem statement, there needs to be a shared vision and shared goals. In one of the data teams, the sector director is happy to take the lead. The observation showed how she firmly indicated which problems should be solved according to her. The sector director interrupts the external data coach. There is not always room left for others to talk. In a different data team a teacher indicated that he questioned the problem formulation as the same subject was already being investigated by another data team within the same field. The school management indicated that this was not a problem and all data team members accepted the explanation given. In yet another data team, there has been a lot of brainstorming and all members noted problems within the department that they liked to investigate. The chairman ensured that everyone was involved in the process and that everyone had a say, but he also shared his own vision during the meeting.

Regarding key focus of everyday practice, observations showed the following: During casual conversations in the staff room, team members of the data team within the department of mathematics indicated that there was no room for the adjustments that should be made according to the results of the data team research. There was no facilitation for it. However, for the data team within the department of English language all measures are still being applied. The textbooks are still being used and there is more effective communication within the English department.

With respect to communicating, both observations and teachers reported that staff who are not involved in the data teams, sometimes have no idea about the progress and results within the data teams. The knowledge that is gained within the data teams is hardly shared throughout the whole school. For example, one of the team leaders indicated they know nothing about the data teams and what they do. The data team within the department of mathematics reported to see this as a loss and therefore aims to share the process and outcomes also with other school members. Their information will be shared by e-mail and via the weekly bulletin in order to hopefully reach everyone.

**Strategic resourcing.** With regard to staff recruitment, interviews showed that teachers can indicate that they want to join a certain project and can then receive time to spend on their task. If you have been assigned a task that you cannot cope with, you can discuss this with your team leader. In principle, the team leaders divide all tasks for their team. In doing so, they take into account the division of tasks of the previous year and see if anything needs to be changed. During the performance interviews and appraisal interviews, department leaders inquire about the interests of their staff members. They take the interest into account when allocating tasks.

With respect to establishing conditions that support teachers, interviews suggested when teachers themselves are enthusiastic about a certain topic, they can indicate this. If teachers wish to start a new project, most of the time but they will not be directly facilitated in hours. One of the sector directors makes an overview with all the tasks within the team and the corresponding responsible person. This way, all staff know who is responsible for which project and tasks will not be forgotten or being duplicated.

Concerning aligning resources and processes by school leaders, this research showed that the data team members each receive 40 hours per year on their task letter to attend data team meetings and to work on the data team intervention. Opinions on the level of tasks hours vary, some find the task hours too little while others are satisfied with it. Within the data team of Dutch language, data team members were less enthusiastic about working with data, because they are not interested in working with numbers. Nevertheless, the school management wanted this department to work with data as well as they want all teachers to be skilled in using data for increasing student performance.

**Creating climate.** With regard to openness in communication, first of all, the inspectorate indicated that there is quite some openness and transparency in communication in this school. The doors are usually open and staff is free to ask questions and walk in whenever and wherever they want. Sector directors and team leaders know many students by name. Some of these school leaders

are at the top of the stairs in the morning to welcome students and colleagues. They show interest, remember things that are said and are involved according to their staff.

As for mutual caring and trust and fostering continuous dialogue, teachers reported they feel free to share they are dealing with a problem and that there is time to discuss their problems. The climate is characterized by mutual caring and trust. Observations showed that both school leaders and teachers are interested in each other. People start the day with a cup of coffee and with a conversation about work or their personal lives. At the end of every week there is a drink at work where about twenty people are present. Likewise, personal problems are discussed in the workplace and school leaders think along in order to solve problems. During the breaks, most teachers and school leaders come to the staff room to meet. There are only a few teachers who continue working in their classroom.

Regarding taking risks, team leaders indicated during interviews that they want to give people the space to stimulate their intrinsic motivation and therefore teachers are allowed to take risks. According to one of the team leaders all initiatives teachers take are taken seriously. One of the sector director indicates that it is important for her to make genuine compliments, to give people space and to give them confidence. She finds expressing appreciation of great importance. She reports that this is being appreciated. Additionally, she mentioned the collaboration culture to be very good: *'This is mainly due to the low threshold and transparency of the organization'*.

The data team intervention means to involve all data team members in decision making. However, observations showed that there were large differences between data teams regarding the process of the problem statement. Whereas one data team chairman let everyone have their say, another data team was mainly guided by the ideas of the chairman.

The data teams were initially supervised by an external data team coach. The school wants data teams to be able to operate independently in the future, which is why they have already introduced many teachers to the data teams to get acquainted. One data team is already operating independently, consisting of teachers who participated in a previous data team only.

During the investigation, the data teams are making recommendations to the management that they believe will lead to an improvement in education or even to a solution to the problem. The management then determines whether and which recommendations will be implemented. According to several teachers, the work of data teams were not taken seriously as recommendations were not implemented as they were too expensive.

With regard to knowledge brokerage, staff reported that there was little or no communication about data teams and their results. The data team members within the English language have given a presentation about their processes, but this was a long time ago. Most of the staff do not remember what has been discussed here. The management will discuss how other staff members can also be involved in the entire process of the data team so that knowledge can be brokered. The head of education believes that the departments should be informed by the head of departments.



Within the department of English language, many changes have emerged from investigating with the data team concerning communication. According to the head of department, the communication within the group has been greatly improved and colleagues dare to address each other.

### **Understanding and Developing People**

**Individual support.** Data on the encouraging of teachers' reflection showed that teachers are asked to reflect on themselves as part of the three-year-cycle in which they are assessed on their functioning. Also, teachers are supported by the school management as they are visited during their lessons ensuing in feedback for their practice.

With regard to motivating teachers, team leaders reported that they try to motivate teachers by radiating energy for their jobs. Teachers are also being motivated by their school leaders due to compliments that are given. The compliments are related to their practices. This was confirmed by several teachers. With regard to rewarding teachers, this happens most of the time by giving compliments.

At the start of a school year, team leaders know about the interests of their staff and try to connect teachers to projects of their interests. When multiple teachers are interested in participating in a certain project, team leaders try to motivate some of them for different projects. In the end, team leaders choose who will participate in which project. Additionally, team leaders mentioned to increase motivation for projects by explaining why someone fits so well in a project and by expressing confidence to someone.

With respect to providing information and resources to teachers, team leaders suggested that when teachers have ideas for projects themselves they can convey this to their team leader. Team leaders consult whether teachers can get task hours to invest in this project. Most of the time, there are no hours left but in the next school year, people can get support when the project seems to be successful.

Regarding the planning of professional development activities, data showed that teachers are individually supported by the school management as they are offered courses to professionalize, study days are organized and PLCs are established. However, mathematic teachers appointed a mandatory course in which they had to learn about working in Excel. They call it a waste of time as the course was below their level. Also, workshops organized for the education support staff were not fitting their needs.

For data teams, school leaders tried to motivate teachers by supporting them in time and also by emphasizing the importance of data use. According to the management the school will be judged by these kind of numbers. This was also communicated in a newsletter. During the problem exploration of the data teams, the sector director tried to encourage the team by emphasizing the size of the problem and the usefulness of it. She presented it as a challenge that they must work on as a team.

Within data teams the data team members were critical about the data that was brought by the chairman. According to one of the data team members, the level of data was not fitting the problem: *“The chairman was not skilled herself in using data”*.

With regard to allowing teachers to make mistakes, no data was collected.

**Coaching teachers.** Concerning classroom visits and providing feedback, data showed that all teachers get visited by their team leader at least every three years in order to get assessed. During the performance interview, teachers are provided with feedback. Sometimes teachers get visited more often, because they are new in the organization or because they request for help. For example, the observations showed how a teacher asked for the help of his team leader regarding his teaching practices. He explains to be insecure and asks for advice on how to control the students. The team leader confirms it is not strange to feel this way and he felt the same back in the days. The insecure teacher is provided with feedback.

With regard to peer coaching, new teachers are guided by experienced teachers who have been working over a longer period of time in this school. The management also invests in providing feedback to teachers of different schools in the same establishment according to their school plan. However, in the observations or interviews this was not discussed. It is not clear whether it happens in practice.

What has been seen in practice, is two teachers who tried to use data but they are not satisfied with their results so they asked their team leader for help. He runs through all data with the teachers and explains signification.

**Modeling.** The management uses data themselves in order to investigate school performance. For example, they investigated the differences between national exams and school exams. Also, by introducing data teams and by taking part in a data team themselves, management members show that they emphasize the use of data. However, some teachers mention that there was no focus on the evaluation of the data team, while the management expects their teachers to evaluate their practices.

**Empowering teachers.** According to one of the sector directors, the management tries to speak with one voice. However, sometimes distinctions between departments or sectors are made for exceptional cases. Usually there are strict rules for testing within the curriculum, but observations showed how a teacher asks for permission to deviate from the curriculum. The sector director pronounced to have faith in the teacher and therefore he may deviate and pick different moments to test students. He will determine himself which subject matter must be addressed. Likewise, two teachers who want to add new components in their curriculum are told to discuss this with their head of department and come to a joint decision.

With regard to organizing PLCs, data showed that the management has introduced four data teams up to now. Interviews show that the management decides whether the recommendation will be carried out or not, even when staff is convinced that the recommendations are of great importance.

Therefore, several teachers mentioned not to feel like their opinion is taken into account. Autonomy for teachers is not provided concerning decision-making committees.

Concerning encouraging change leadership, no data was found during this research.

### **Conclusion and Discussion**

The aim of this research was to investigate what school leadership looks like in a secondary school with PLCs focused on sustainable data use. In this chapter conclusions will be drawn on the basis of the results of the study. Finally, contributions and limitations of this research will be addressed and recommendations for further research will be presented.

The conclusions will be explained per core responsibility of school leadership in the text below. But first of all, a conclusion on the sustainability of PLCs within the school is drawn.

**Sustainability.** Although this secondary school was expected to sustain school improvement, this research showed that the data team intervention was less sustainable than thought at first sight. First of all, this study revealed that when external support is withdrawn, teachers would not use data in their daily work when they are not facilitated in terms of time. The use of data is not embedded in the daily work of teachers.

Second, the results showed that both knowledge of data teams itself and knowledge gathered within data teams is poorly shared throughout the school. However, for schools to sustain school improvement, it is important to share knowledge with all stakeholders (Hubers et al., 2018).

**Managing the teaching and learning program.** Within the school, facilitation is entirely determined by the management. However, it is remarkable that decisions on subject matter are mainly made within the departments as research suggests that schools where school leaders are directly involved in design and implementation of the curriculum and learning program score higher on standardized assessments (Marzano et al., 2005).

Furthermore, the results showed that school leaders emphasizes the use of systematic data use by introducing data teams. On the other hand, staff found the evaluation of the data teams to be missing in order to adjust interventions and therefore the use of systematic data use is not emphasized. However, in some ways teachers are motivated by school leaders to gather different types of data when looking at student performance. Using different sources to determine school performance is important for the sustainability of data teams (Leithwood & Riel, 2003). Unfortunately, using data in the daily work of teachers is not structurally embedded (yet).

With regard to coordination of the learning program, the observations showed that a large part of the coordination takes place through fixed meetings which are prepared by formal leaders. There are meetings on several levels. This school-wide coordination across classes and year levels has a positive influence on student achievement (Robinson et al., 2008).

Likewise, evaluation takes place in these fixed meeting and also in fixed activities like performance and assessment interviews. Teachers are expected to collect multiple types of feedback

on teacher evaluation. According to Pont et al. (2008) this systematic data use improves teaching and student progress.

**Organizing and (re-)designing the organization.** The vision and mission of the school were calibrated and established in working groups, meaning that staff members of every department, one way or another, are involved. However, the school plan is revised every four years in which only the management initiate proposals.

Additionally, when setting goals it is also important to use a bottom-up approach (Cruickshank, 2017). According to the management, the head of education is mainly responsible for setting goals on school level and the management is responsible for the implementation of his thoughts. It is remarkable that, despite this top-down approach, school staff praises the head of education as they call him a true connector and an open and transparent man. An explanation for this may be that staff is impressed by the knowledge the head of education has for which they respect him. With regard to setting goals within the teams and data teams, different approaches were found. While one team leader allows thinking along about setting goals within the team by requesting for input, the other team leader only asks for permission on the proposals he presents. According to Leithwood and Riel (2003), using a top-down approach could lead to discrepancy between school goals and teachers' goals with the results of less acceptance of group goals. However, it seems that there is no discrepancy between school goals and teachers' goals within this school, even though a top-down approach is used. This might be due to the fact that staff follow the ideas of the head of education because they respect him for his knowledge and therefore trust him.

Once the goals are set they need to be communicated by school leaders in order to engage other stakeholders (Mulford et al., 2009). This also applies for the brokerage of knowledge, while sharing knowledge makes data more accessible and is likely to facilitate school staff's communication about data. Subsequently, sharing knowledge affects the sustainability of PLCs (Hubers et al., 2018). Unfortunately, this study revealed that there was little or no sharing of knowledge to colleagues throughout the school. Many teachers are not up to date with regard to the data team intervention.

Although this study revealed a lack of communication, school leaders showed a close position to teachers which is demonstrated in teachers' search for personal advice for practices from school leaders, but also within the school management keeping their doors almost always physically open. In addition, school leaders are among teaching staff during breaks and talk about personal interests.

In addition, school leaders increase teacher commitment within their school by strategic resourcing in which they ensure that resources and processes are in place to empower teachers. For example: the inclusion of data team meetings in the planning of teachers makes sure the intervention becomes part of the school organization. Also, tasks are divided by team leaders who take into account the interest of their staff members resulting in higher teacher motivation (Leithwood, 2013).

**Understanding and developing people.** First of all, teachers are motivated by receiving compliments for their practices by their school leaders. Rewarding also takes place in the form of

compliments which contributes to staff motivation and commitment (Leithwood et al., 2008). Also, higher teacher commitment is influenced by school leaders that emphasize the importance of data use and the usefulness of fixing the research problem. Furthermore, teachers are supported individually by school leaders who visit lessons and give direct feedback. New employees are also supported individually by experienced teachers as a form of peer coaching. Also, the management invests in providing feedback to teachers of different schools in the same establishment according to their school plan. Although this is mentioned in their school plan and the management quoted this in interviews, it is not clear whether it actually happens in practice.

Though teachers are motivated and individually supported by their school leaders in several ways, there is also room for improvement. Teachers could be even more motivated when they get facilitated for projects that they want to invest in as the teachers are already intrinsic motivated. Also, teachers are not empowered to make important decisions themselves. For example, teachers were not allowed to make important decisions when for instance they want to differ from the curriculum or they want to implement the recommendations that flow from the data teams. Leadership should focus on teacher empowerment as it motivates teachers to go beyond self-interest and formal requirements of the job to embrace organizational goals (Nguna et al., 2006). Implementing data teams results in working together on joint school goals. Authorizing teachers to make valuable decisions enhances teachers' self-esteem and work satisfaction (Katzenmeyer and Moller, 2001). In order to create even more commitment among teachers, intellectual stimulation should be offered and reflection should be encouraged (Leithwood et al., 2008). Although staff is offered different courses for professionalization, study days are organized and PLCs are introduced, there were also teachers who confirmed that a particular course did not fit their needs as it was too easy. Therefore it is important for school leaders to involve their staff in selecting courses. In addition, the results of this study showed a lack of evaluation of the data team intervention by both school leaders and teachers. This does not enhance teachers' enthusiasm for change as school leaders should set examples to follow consistent with the school's vision and goals (Leithwood & Riel, 2003).

**Contributions.** The findings of the present study give insights into the role of school leadership for sustainable school improvement by PLCs for practices. This study aimed to give more in depth information into school leadership in a secondary school which implemented data teams as a form of PLCs. This study provides insights to help support schools and school leadership for sustainable school improvement in data teams with possible leadership activities and tasks that affects sustainability. This knowledge can be used by school leaders in order to improve their leadership and make innovations sustainable.

This study showed the importance of facilitation. For example, teachers need to be facilitated in time and meetings for data teams have to be scheduled in their schedule. Taking care of these peripheral matters, shows teachers that school leaders care about the intervention.

Another sustainable factor that was found in this study is related to this. The vision and mission of schools are of great importance for the sustainability of interventions. When an intervention is introduced into a school, it should be consistent with the vision and mission of the school. For the data team intervention this means that school leaders should underline the importance of data use. Therefore, the use of data should be adopted into the policy of the school as well as school leaders being role models in using different kind of data for problem solving.

In addition, school leaders should emphasize the use of knowledge brokerage and make sure that knowledge gained in PLCs is shared throughout the entire school. Sharing knowledge beyond the PLC makes sure all staff is aware of the intervention and its output and subsequently leads to sustainability.

**Limitations.** Some limitations of this research need to be noted. The four most important ones are: 1) lack of time to test the log book, 2) need for longitudinal research, 3) drawing conclusions and 4) the confirmation of conclusions. These limitations will be briefly discussed and recommendations for follow-up research will be provided.

While collecting data the researched encountered some difficulties concerning time. First of all, there was no time to test the log book. Therefore, in the beginning it was challenging to make choices about what to write down and what to leave out. Additional testing of the instrument is recommended to increase reliability and review its completeness, for example by testing the instrument at a random school.

Second, data gathering took place in a relatively short time of the school year in which not everything could be observed. For example, the school plan and school management indicated that they visit teachers' classroom and provide them with feedback. However, research suggests that most school leaders lack in this process, as there often is not enough time to do this. Because the data was only gathered within a period of six weeks, it is not clear whether plans like visiting classrooms actually are carried out. It is recommended to conduct the same research during a complete school year.

Both limitations directly lead to the third limitation which involves data. When writing the results, it was now and then challenging to draw conclusions as important data was sometimes missing. For example, there was no data collected on the sub code 'allowing teachers to make mistakes'. In order to draw reliable conclusions on every school leaders' tasks, it is recommended to collect data during a longer period of time and to spread observations over the year.

Finally, when this research started the researcher assumed the school to sustain school improvement. However, during this study the researcher found the data teams less sustainable than expected. For example, interventions are sustainable when they are embedded in the daily work of teachers. However, this study showed that when external support is withdrawn, most of the teachers no longer use data for their teaching practices. Therefore, not all conclusions on effective school leadership for sustainable data use can be confirmed.

**Recommendations.** Based on the data of this study, it could be possible that school leadership can be improved by using bottom-up approaches when setting a vision and working towards shared goals. It is recommended to flatten the school hierarchy as this results in higher teacher commitment and motivation (Gray & Ross, 2006).

Also, it could be possible to improve leadership by implementing decision-making committees in which teachers are empowered to make important decisions. This will motivate teachers to go beyond self-interest and formal requirements of the job to embrace organizational goals (Nguni et al, 2006). Therefore, schools are recommended to empower teachers to make important decisions.

Last, it could be possible that school leadership can be improved by knowledge brokerage in order to involve all staff members within the school. Sharing knowledge gained in PLCs makes data more accessible and subsequently is likely to facilitate school staff's communication about data. In addition, it affects the sustainability of the PLCs (Hubers et al., 2018).

However, with the collected data within this school, these recommendations cannot be confirmed. Therefore, it would be interesting to investigate school leadership in schools with sustainable data teams and compare observed leadership activities, tasks and behavior to schools that failed to implement sustainable PLCs. Specifically, comparative research can be carried out within schools that make use of decision-making committees and schools that do not, schools that master knowledge brokerage and schools that do not master knowledge brokerage and last, schools using a bottom-up approach and school using a top-down approach when developing vision and mission and setting goals.

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### Appendices

#### Appendix A: Code book

	<i>Code</i>	<i>Definition</i>	<i>Sub-code</i>	<i>Examples</i>
Sustainability	Ongoing process	PLCs continue when external support is withdrawn	Continuation	The fourth data team is functioning independently, but they are facilitated in hours.
	Daily practices	the way of working in PLCs happens during regular work without causing interruption in daily practice throughout the school	Data is used in the daily practice of school leaders and teachers	Only a single teacher reported to use data in his daily practices. However, several teachers indicated not to use data as support in terms of time was withdrawn.
	Share knowledge	Develop knowledge and share knowledge within the entire network	Knowledge is shared	One of the team leaders indicates that he does not know about the purpose of data teams and he does not know if anyone of his staff members is facilitated to take part in the data team intervention.
Managing the curriculum	Planning	The direct involvement of school leaders in design and implementation	Determine course content	Head of department: “Therefore, I asked teachers to look for a new textbook for the coming school years. I got my hands of it, because I don’t teach those classes anymore”.
			Decide which courses are offered	“At the time, the management has reduced the time to spend on the project to one hour a week. We decided to consult this and found the solution to teach double hours every half a year”.

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	Monitoring	Determining school performance along different indicators	Collecting information by research and reflection	During the meeting, poor exam results for mathematics are discussed and there is an agreement on an analyses by the department of mathematics which will be send to the management after it is finished.
			Asking critical questions about performance	The management takes the report of the inspection very serious and sees it as an opportunity to improve their education.
			Monitor and adjust the structural organization	During the meeting, the sector director and team leader discuss about the amount of hours that should be available for a new project.
	Coordinating	Reconcile, ensure that different activities carried out by different people are consistent with each other	Classes and year levels	The structure of the schools ensures that there is coordination within departments, teams and year levels.
			Alignment to school goals	During the study day, courses were offered to educational support staff that had nothing to do with the state of affairs within the schools.
	Evaluation	collecting, interpreting and presenting information in order to determine the value of a result or process	Emphasize the use of systematic data use	Mathematics teacher: "It is a shame that the facilitation for taking part in a data team is ended. Implemented recommendations should be evaluated and if necessary adjusted. Right now, this is not happening".
			Use data on student performance	"We should check whether the large different in grades is due to our strict tests".
			Use data on teacher performance (classroom observation, peer review, self-evaluation etc.)	"Our assessment cycle consists of two performance appraisals and one assessment interview. We are using, among other things, lesson observations and feedback of colleagues".
Organiz	Vision and goals	Develop a vision and goals for school performance	Revise school vision and goals	School goals are set during team meetings and meetings within the departments.

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			Clarity and consensus	Sector director: “Within the department of bilingual languages, things are allowed that are not allowed in our department. There should be speaking with one voice throughout the entire school”.
			Bottom-up / top-down	School goals are set during the team meetings. The team leader proposes the school goals and asks his team members for approval.
			Key focus of everyday practice	A physics and engineering teacher: “The textbook did not fit our school vision. Therefore we developed a new one ourselves”.
			Communicating	A couple of staff members mentioned they have no clue what the data teams are working on.
			Whole staff consensus	Within the data team, the chairman makes sure everyone can have their say and share their opinion.
	Strategic resourcing	Aligning resource selection and allocation to priority teaching goals	Resources and processes are in place to empower teachers	Mathematics teacher: “A lot of time is invested in the data teams, but in the end there is not much done with the findings”.
			Establish conditions that support teachers	Mathematics teacher: “Our data team was told to implement the small recommendations only. The recommendation should not cost money”.
			Staff recruitment	The data teams are composed by the management who asks teachers to participate.
	Climate	Create a psychologically safe environment to work in	Openness in communication	Director of operations: “I make staff experience we do not have endless money. If we make classes smaller, we can spend less money on other things”.

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Understanding and developing people			Staff can take risks	No textbook met their requirements. Therefore, they developed a textbook themselves.
			Mutual caring and trust	Teachers clear conscience in the staff room.
			Fostering continuous dialogue	The teacher is asked by the team leader how she is doing in response to a difficult period she went through.
			Collaborative working	Team leader: "The collaborative working culture within our school is very good. This is mainly due to the accessibility".
			Knowledge brokerage	The fourth data team indicates they want to share their knowledge throughout the entire school. They believe the previous data teams did not share their knowledge.
	Individual support	Promote professional learning and development of teachers	Encourage teachers' reflection	Teachers need to reflect on their practices during the appraisal interviews by using feedback of colleagues.
			Motivate teachers	The team leader indicates that people are motivated to work on projects by making them choose themselves where they want to work on.
			Provide information and resources to teachers	One of the teachers mentioned that the Excel-course did not match his needs as he already knew all of the information shared in the course.
			Allow teachers to make mistakes	No data found
			Rewarding	Teachers are complimented for their approach.
			Plan professional development activities	All staff members are supposed to apply for a workshop during the study day.

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	Coaching teachers	Create conditions for professional growth and provide instructional guidance for teachers	Visit classrooms and provide feedback	Teachers are visited by their team leaders and receive feedback on their functioning during the appraisal interviews.
			Stimulate peer coaching	Young teachers are coached by experienced teachers who have been working on this school for a longer period of time.
	Modelling	Set examples for staff to follow	Use of data for evaluation	“We need to have a look at the big large deviations of grades between central exams and school exams. We should ensure that we do not make our school exams too difficult for our students”.
	Empowering	Distribute authority among people	Providing autonomy for teachers	A teacher who is not able to stick to the curriculum is allowed to change the curriculum and tests.
			Organizing PLCs	The school uses four data teams up till now.
			Allow teachers to make their own decision-making committees	The school introduced data teams. Mathematics teacher: “We shared our recommendations with the management, but we were not allowed to implement all recommendations”.
			Take staff opinion into account	During the data team meeting, a teacher indicates that it seems a waste of time to investigate the same problem in two different data teams. The team leader indicates that it is not the case and that it will still be investigated in this data team as well.
			Encourage change leadership	No data was found



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## Appendix B: Interview questions

Managing the curriculum and teaching program	Planning	<i>Curriculum content</i>	How do you organize teaching? Who decides what is in the curriculum? Are school leaders directly involved in design and implementation?
	Monitoring	<i>Collecting information by research and reflection</i> <i>Asking critical questions about performance</i> <i>Task assignment</i>  <i>Use of time and space</i>	Are teachers encouraged to gather data about performance? If yes, how? Is there any reflection on school goals? How is school performance determined? Do you ask your staff critical questions about their performance? How do you assign tasks to your staff? Do you have any influence on the tasks you do beside teaching classes? How? How do leaders adjust the structural organization of this school (e.g. time and space)? Do you feel like you get enough time to spend on other tasks than teaching? Do you think the equipment within school is sufficient?
	Coordinating	<i>Classes and year levels</i>	How is the coordination of curriculum spread throughout the school?
	Evaluation	<i>Use data on student and teacher performance</i>	Is the use of systematic data use been emphasized? How? What kind of data do you use in order to evaluate the curriculum program?
Organizing and (re-) designing the	Vision and goals	<i>Revise school goals</i>  <i>Clarity and consensus</i>  <i>Bottom-up / top-down</i>	Does your school have a way of monitoring achievement of your school goal(s)? Are the school goal(s) and vision revised if necessary? Who are involved? How often? How do you make sure that there is clarity in goals, standards and expectations? Do you feel like the school goals and your personal goals are kind of the same? How do you make sure that there is consensus about goals? Who is involved in setting the school vision and setting the school goals?

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		<p>Do you feel like you have anything to say about the school goals? Do you feel like you can influence the school goals? Do you feel engaged in setting school goals?</p> <p>Does your school introduce new programs with a clear implementation plan?</p> <p><i>Key focus of everyday practice</i> Do you think the school goals are a key focus of everyday practices?</p> <p>How do you make sure that goals are embedded in school and in the classroom?</p> <p>Is there any control if everyone is working on the school goals?</p> <p>Are you able to tell me what your schools priorities are in terms of goals?</p> <p>Do you think that all stakeholders are aware of what the school priorities are?</p> <p><i>Communicating</i> Do teachers in this school have the information they need to participate in school decision-making?</p> <p><i>Whole staff consensus</i> Do you work toward consensus in determining which initiatives can be implemented? How?</p>
	Resourcing	<p>How do you ensure that resources and processes are in place to empower teachers to teach well?</p> <p>Do you feel like you have any influence on the assignment of tasks other than teaching classes?</p> <p>Are you happy with your task assignment?</p>
Climate	<p><i>Openness in communication</i></p> <p><i>Staff can take risks</i></p> <p><i>Shared norms, values and beliefs</i></p>	<p>Do you think that there is openness in communication within this school?</p> <p>Do you think that you are allowed to make mistakes whenever you work on innovations?</p> <p>Do you feel like you have the opportunity to try something new?</p> <p>In this school, are there shared norms and values? Explain.</p>

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		<p><i>Mutual caring and trust</i></p> <p>Do school leaders in this school promote an atmosphere of caring and trust among staff?</p> <p>Do you think there is mutual trust between school leaders and teachers?</p> <p>Do you think there is mutual trust between teachers?</p> <p><i>Collaborative working</i></p> <p>How do you promote collaborative work cultures?</p> <p><i>Knowledge brokerage</i></p> <p>How is important information shared within PLCs?</p> <p>How is important information shared with colleagues who were not involved?</p>
Developing and understanding people	Individual support	<p><i>Encourage teachers' reflection</i></p> <p>How do you individually support your staff?</p> <p>Do you feel like you are individually supported by anyone in this school?</p> <p>Are you encouraged to reflect on your own practices?</p> <p><i>Motivate teachers</i></p> <p>Do you stimulate your staff to gain knowledge? How?</p> <p>Do you feel motivated by someone? If yes, can you explain your relationship with this person?</p> <p><i>Provide information and resources to teachers</i></p> <p>Do you feel intellectual stimulated by the school management?</p> <p>Do you feel like you are offered opportunities to learn?</p> <p><i>Allow teachers to make mistakes</i></p> <p>Do you allow your staff to make mistakes when they try to innovate their practices?</p> <p>Do you feel allowed to make mistakes when trying something new?</p> <p><i>Rewarding</i></p> <p>How do you show your staff that you respect them?</p> <p>In what way do you reward your staff for their input?</p> <p><i>Sensing people</i></p> <p>Do you think that the school management cares about your feelings and needs?</p>
	Coaching teachers	<p><i>Visit classrooms</i></p> <p>Do you observe your staff during their lessons?</p> <p>How often did a school leader visit your school lessons last year?</p> <p><i>Advice on instruction</i></p> <p>Do you think you give effective feedback to your staff? How?</p> <p>Do you advice your teachers about change in instruction?</p>

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	<i>Stimulate peer coaching</i>	<p>Do you stimulate teachers to visit each others classrooms?</p> <p>Do you stimulate teachers to give peer-feedback? How?</p> <p>Did you visit a colleagues' lesson last year? Were you stimulated by the school management to do so?</p>
Modelling	<i>Set examples for staff to follow</i>	Describe how you are being a role model to your staff.
Empowering	<i>Providing autonomy for teachers</i>	How do you empower teachers to take on leadership roles?
	<i>Organizing PLCs</i>	How do you provide autonomy for teachers?