

Evaluation of Data Driven Teaching in Primary Education
A mixed methods study

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Master Educational Science and Technology
Master Thesis

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Abstract

In the period 2010-2012 teachers teaching in schools of the school board Quo Vadis participated in the FOCUS-project to improve school quality. In that project, teachers learnt to apply data driven teaching by the use of their student monitoring system ParnasSys. This year (2016) the school board aims to evaluate the outputs of the FOCUS-project. Furthermore, the board aims to improve self-evaluation of schools on their school quality by implementing the 'audit systematic', which has been developed by a specialized organization. This means that an audit team will be formed and trained to visit schools of Quo Vadis to check if their self-evaluation, in this study with respect to data driven teaching, provides a valid description of the daily practice in school. The audit team will focus on all aspects of the inspectorate framework. However, in this study only data driven teaching will be focussed on, since for this topic the school board does not have an appropriate audit framework yet.

This study exists of two parts. The first part focusses on the question to what extent teachers are able to use the student monitoring system for data driven teaching and what their vision and experience with respect to data driven teaching is. This will be determined by the use of a survey and interviews. The main question that will be covered in the second part is how to assess data driven teaching during the audits. This will be studied by conducting an exploratory research and testing the conducted audit framework during several audits. Finally, suggestions for improvements are provided by the use of the previously mentioned data. It is expected that teachers score equal or higher on the survey in comparison with the post-test of the FOCUS-project and will be using the analyses performed in ParnasSys in daily practice for data driven teaching.

In order to determine the ability of teachers to interpret quantitative output in ParnasSys (e.g. graphs and tables), the same survey as at the end of the FOCUS-project was conducted. At that time, in 2011, the average teacher score was 63 percent correct. Results show that in 2016, teachers scored an average of 75 percent correct. Moreover, teachers who participated in the FOCUS-project scored higher (77 percent) on the questionnaire than teachers who did not participate (70 percent). If the knowledge of data driven teaching is actually applied in practice can now be evaluated during an audit by the use of the in this study developed audit framework. Moreover, the vision and experiences of the teachers with respect to data driven teaching were assessed by interviews. The attitude of teachers towards the use of data and the implementation of what is learnt in the FOCUS-project in daily practice were discussed in the interviews. Data showed that schools of Quo Vadis differ in which analyses of ParnasSys are used in practice and for which subjects plans are made, applied and evaluated in daily practice. Moreover, older teachers seemed to be less motivated to use ParnasSys and group plans. Finally, younger teachers who had not participated in the FOCUS-training, stated to have a need for a training with respect to data driven teaching, since in teacher training colleges this topic is hardly covered.

Recommendations for Quo Vadis are to provide guidelines for schools for which topics group plans should be made and which analyses are important to use in practice. Then, data driven teaching

in schools of Quo Vadis is more consistent and mobility for teachers will become more easy. Furthermore, since younger teachers are interested in a training, Quo Vadis might organize training for this group or might educate internal coaches (IB'ers) how to help new teachers to work according to the guidelines of data driven teaching.

Preface

The study described in this thesis was performed for the master Education Science and Technology at the University of Twente. Both an evaluative and design study were conducted with respect to data driven teaching in the school board Quo Vadis in Deventer. I would like to thank some particular persons in the University of Twente and Quo Vadis. First, I am Martijn Vrielink of Quo Vadis thankful for providing me the setting to perform this study in and to collect the data. Furthermore, I would like to thank the other colleagues of Quo Vadis for making me feel welcome at the office. Moreover, I would like to thank Hans Luyten of the University of Twente, my first supervisor, for providing feedback and improvements for this study. Finally, a thank for Marieke van Geel, my second supervisor, for the feedback you provided me to finalize my master thesis.

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1. Introduction

This chapter provides a description of the context, the school board Quo Vadis, this research was conducted in. Then, the problem the organisation is dealing with is defined.

1.1 Context description

This master thesis was conducted within the organisation Quo Vadis. Quo Vadis is a school board with 26 schools providing Catholic and Protestant primary education in and around Almelo and Deventer. More than 400 employees provide education to about 4200 students.

1.2 Problem Statement

In educational policy-making, quality care, school improvement and school self-evaluation are important themes (Schildkamp, 2007). To improve quality of education by using data, Quo Vadis implemented data driven teaching (in Dutch *opbrengstgericht werken*) in 2010 by participating in the FOCUS-project. Some schools participated in project I and other schools one year later in project II. In this project teachers learned to use data for designing their education (Visscher, Peters & Staman, 2010). The definition of data driven teaching used by the Dutch inspectorate is the systematic and targeted effort to maximize student performance (Ministerie van OCW, 2011). In the ideal situation all teachers within Quo Vadis are implementing data driven teaching.

However, Quo Vadis wants to take a step further in improving the school quality for several reasons. First, the inspectorate is executing changes in their supervision. In their new supervision, self-evaluation on school quality by employees of the school themselves and internal audits carried out by employees of Quo Vadis focussing on school quality are important components (PO-Raad & Education Inspectorate, 2015). Secondly, some schools are at risk in their learning outcomes. Those schools scored several years below the standards set by the inspection and received the label weak. This is a development the school board aims to reverse by analysing the quality of education of the schools timely and to arrange improvement processes. The school board wants to achieve this by improving the use of data driven teaching and by implementing internal auditing. Three principals, three teachers and an employee of the school board will form the audit team and will be trained to perform audits. The team will visit schools of Quo Vadis to check if their self-evaluation, in this study with respect to data driven teaching, provides a valid description of the daily practice in school. Furthermore, the team provides advices for improving school quality. The audit team will focus on more subjects than data driven teaching. However, in this study the aim is to determine how data driven teaching can be assessed during the audits, since for this topic the school board does not have an appropriate audit framework yet.

Data use is important for school improvement (Schildkamp et al., 2012). Apart from improving the schools that have been labelled as weak by the Dutch school inspectorate, ensuring and improving the level of other schools is of great importance for Quo Vadis. For data driven teaching, teachers should be able to monitor and analyse student performance systematically (Education

Inspectorate, 2012a). Therefore, the school board aims to know to what extent teachers are able to use their student monitoring system, ParnasSys. Dutch studies with respect to the use of student monitoring systems show that systems are strongly underutilized and even report erroneous use of this way of performance feedback (Bulder, 2008). During the audits, the audit team expects to find out how teachers apply and evaluate data driven teaching.

The FOCUS-project showed that the use of a student monitoring system and data driven teaching ensured a data analytic culture within schools. Through data driven teaching teachers became more aware of the learning progress of students and of the zone of proximal development (Faber et al., 2013). With respect to audits, the PO-Raad & Education Inspectorate (2015) have conducted a pilot in primary schools on forms of self-evaluation and their effects. The results showed that the effectiveness depends on how the school handles the findings and recommendations in the audit report. Furthermore, retaining and securing the improvements are important aspects of the long-term effect of audits. Moreover, De Boer, van Hoffen, Kamphof, Veenstra & von Weijhrother (2013) have investigated if audits lead to demonstrable and sustainable forms of school improvement. Respondents indicated the combination of self-evaluation and the audit provides added value to their education. In schools that opted for audits without self-evaluation, the effects were less visible.

In order to know how teachers can improve data driven teaching, gaining insight in the knowledge of teachers to use ParnasSys is important. Furthermore, the actual use of data within the schools of Quo Vadis is supposed to be determined during the audits. This year a few audits will be performed by the audit team. Before the audits will be conducted within all schools of Quo Vadis, how to assess data driven teaching during these audits is supposed to be explored.

In summary, Quo Vadis aims to ensure the quality of the schools in two ways. First, by determining to what extent teachers are able to use ParnasSys for data driven teaching and what the vision and experience of teachers are with regard to applying that knowledge of data driven teaching. Secondly, by auditing to see if data driven teaching is actually implemented in the schools or improvements could be made. The goal of this research is to investigate to what extent the teachers of the primary schools are able to use ParnasSys (research question 1), what their vision and experiences are with respect to data driven teaching (research question 2) and how to evaluate data driven teaching during the audits (research question 3). Last, Quo Vadis expects an advice on how to improve data driven teaching (research question 4).

2. Theoretical Framework

In the theoretical framework the concepts important to answer the research questions are explained. The main concept of this study is data driven teaching. This concept is overarching in all parts of this study. Other relevant concepts for the study are the audit systematic and framework of the inspection.

2.1 Data Driven Teaching

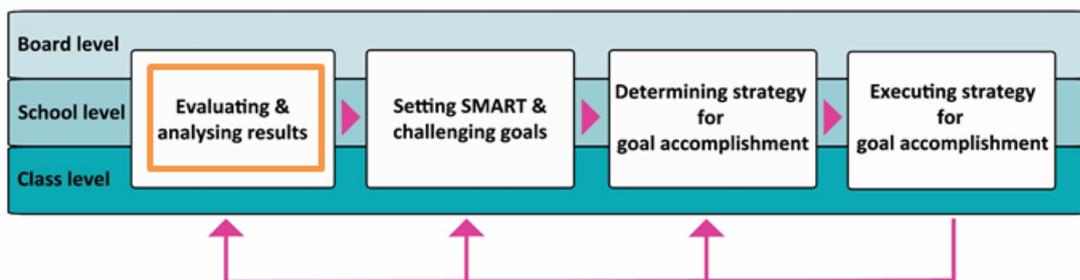
Data Driven Teaching (in Dutch *Opbrengstgericht werken*), is systematic and purposeful working to maximize the performance of students (Education Inspectorate, 2010). Ikemoto and Marsh (2007) formulated data driven teaching as using data to give direction to the decisions in order to improve the outcomes of students and schools. The aim of data driven teaching is following systematically the advances of the students and to provide additional care to specific students (Visscher et al., 2010). In Dutch schools for the process of data driven teaching the cycle of action-oriented working (in Dutch: *Handelingsgericht werken*) is often used. This cycle consists of four phases: observing, understanding, planning and realizing (Pameijer, Beukering & de Lange, 2009). In the first phase, tests of students are analysed, students are observed and conversations with parents and students take place. Then students who are in need of extra care are signalized. In phase two, the special educational needs of students are stated, goals are set and how to reach these goals is explained. In the third phase, students with the same needs are clustered and a group plan is set up. Finally, the group plan is performed in the classroom and thereafter the cycle starts at the first phase again (Pameijer et al., 2009).

Data driven teaching can be approached on four levels (Education Inspectorate, 2010): school, group, student and school board. By the Education Inspectorate (2010) data driven teaching is evaluated on these four levels. First, on school level, data that is necessary for yearly evaluation of outcomes is available in schools. However, for a proper evaluation showing the outcomes is not sufficient. Those outcomes will become valuable when they will be compared to the goals the school set. The ambition of the schools are often not stated. Consequently, schools miss a solid foundation to improve. Less than half of the schools can demonstrate to strive for good results and high expectations of their students (Education Inspectorate, 2010). On the group level it was shown that all schools are conducting tests. However, the step of analysing these results is often not performed. Therefore, the question is if adaptive teaching, adjusting the instruction between differences in students, is effective in those classrooms. Adaptive teaching was performed in 70 percent of the schools. Furthermore, teachers of pre-schoolers are providing less goal-oriented education than teachers in higher grades. Therefore, the focus on outcomes in this grade is minor (Education Inspectorate, 2010). The evaluation on student-level showed that in case of failure of a student, when a student does not reach the set criteria, at less than half of the schools problem analyses are performed. Moreover, the inspection showed that the analyses on learning gains are modestly performed. On 17 percent of the schools for all students the learning gains are determined (Education Inspectorate, 2010). Last, evaluation on school-board-level showed that some school boards showed little interest in the outcomes of their schools. Furthermore 20 percent of the schools never have conversations with the school board about the outcomes (Education Inspectorate, 2010). In conclusion, the Education Inspectorate (2010) showed in their report that data driven teaching is not applied as expected on all levels. Improvements are desirable, since data driven teaching is expected to improve student outcomes (Staman, Visscher & Luyten, 2014).

2.1.1 Set up FOCUS-Project

In the FOCUS-project school teams learned to use data from student monitoring systems like ParnasSys, the system that schools of Quo Vadis uses. The aim of the project is to improve the quality of the instructions and the performance of the students. Research showed that the training had a beneficial effect on data driven decision making knowledge and skills of the teachers. Furthermore, both pre-test and post-test showed positive attitudes towards data driven decision making (Staman et al., 2014). Data driven teaching learned in the FOCUS-project is an iterative process (Ikemoto & Marsh, 2007). For achieving the goal of the FOCUS-project, the model in Figure 1 was introduced for systematically working with data (Keuning & van Geel, 2012). This model corresponds to the action-oriented cycle of Pameijer et al. (2009) mentioned in 2.1 and to the PDCA (plan, do, check, act) - cycles. The PDCA-cycles allows for a set pattern of setting goals, measuring and discussing of the trajectory of data driven teaching (Teitler, 2013). One difference is that figure 1 does not start with formulating goals, but by analysing outcomes of students, since a teacher is solely able to set goals when it is clear where outcomes can improve (Focus, 2016).

Figure 1. *Steps of Data Driven Teaching.*



Source: Keuning & van Geel (2012)

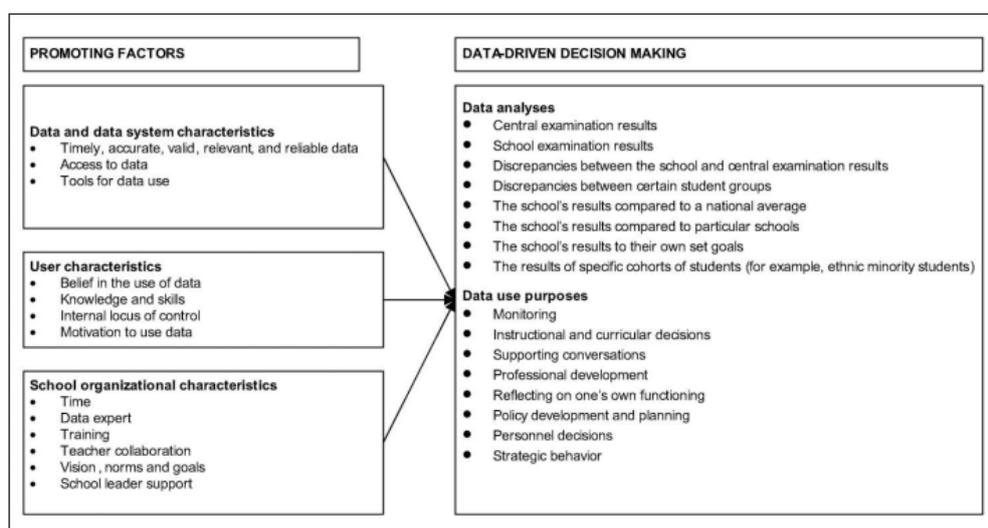
After completing these four steps, the teacher can start with step 1 again or for example determine another strategy and take one step back to step 3. However, beside these steps other components and activities are important in data driven teaching (Staman et al., 2014). Knowledge and skills are required for realizing data driven teaching. After analysing results, goals should be set, activities should be planned and the instruction and organization should be performed. The knowledge and skills the teachers are required to perform these activities are not self-evidently forthcoming and therefore the FOCUS-training was provided (Staman et al., 2014). Besides knowledge and skills, the organizational structure should be arranged for the introduction of data driven teaching like professionalization of teachers and time. To improve individual and organizational performance, the actions of the main performer of data driven teaching should be evaluated and discussed regularly. So, accessibility to data of student performance is a beginning, but other characteristics play an important role to perform optimally (Staman et al., 2014).

Mandinach & Gummer (2013) tried to define the concept data literacy by providing skills and knowledge educational staff needs to possess to use data in an effective manner for daily practice. However, this concept is not fixed, since the skills and knowledge depends on the role of a specific person in the school (Mandinach et al., 2013). The FOCUS-project sets minimal goals teachers in primary education should reach to be data literate. Teachers learned about three main themes (Focus, 2016). First, teachers learned to analyze information from ParnasSys to have a representation of the performance of the school and know where to improve by using a cross-section of student performance of all groups at one moment, trend analysis of one specific year, trend analysis within a group of students and performance growth. Secondly, teachers learned to identify educational needs of students and to translate this into a didactic approach to improve outcomes. Last, teachers learned to formulate performance- and content goals which should be reached at the next testing moment. These goals are presented in a group plan. Then, this plan is carried out in practice and during this trajectory teachers should monitor if the set goals will be reached (Focus, 2016).

2.1.2 Factors Influencing Data Use

According to Schildkamp et al. (2012) data use depends on several factors and can be used for different purposes (Figure 2). Since this figure is used for secondary education, not all data analyses are relevant for this study. However, the fundamental idea of this figure, will be used for gaining deeper insight in promoting factors, data analyses and data use purposes of the teachers within Quo Vadis. By promoting factors the focus will be on data characteristics, user characteristics and school organizational characteristics. These promoting factors are considered to be important to gain insight in the vision and experiences of teachers with regard to the implementation of data driven teaching.

Figure 2. Promoting Factors, Data Analyses and Data Use Purposes.



Source: Schildkamp et al. (2012)

Visscher & Ehren (2011) confirmed the above mentioned promoting factors in their model as well. Essential characteristics for achieving better results in all aspects is setting goals, keeping track of the learning outcomes and working methodically and result-oriented (Education Inspectorate, 2010). Quo Vadis expects schools to have a sufficient support structure which is characterized by: the use of a student monitoring system for the subjects reading/ language, mathematics and social-emotional development and to implement data driven teaching by translating results of tests into group plans and action plans. To what extent teachers are able to use ParnasSys, the student monitoring system of Quo Vadis, will be determined in the first part of the study.

2.2 Audit Systematic for Improving School Quality and Self-Evaluation

This year Quo Vadis implemented the audit systematic with the aim to improve the quality and self-evaluation of schools. First, what is meant by school quality care and self-evaluation will be stated. Then, more insight in the audit systematic as implemented by Quo Vadis will be provided.

School quality and school quality care are closely related to the self-evaluation in a school (Schildkamp, 2007). The definition of quality care depends on the perspective of a person. Therefore, a specific definition of quality care is needed.

Quality care can be divided in quality control and quality improvement. According to Schildkamp (2007) quality control can be defined as *'the process of gathering information on the discrepancy between the current and target situation'*. By target situation the goals and mission of the primary school is meant. Quality improvement is about actions resulting from the observed discrepancy in order to decrease the discrepancy (Doolaard & Karstanje, 2001).

Schildkamp (2007) defines school self-evaluation as *'a procedure involving systematic information gathering which is initiated by the school itself and aims to assess the functioning of the school and the attainment of its educational goals for the purposes of supporting decision making and learning and for fostering school improvement as a whole'*.

To improve school quality, self-evaluation might help to recognize problems and observe development initiatives (Schildkamp, Visscher & Luyten, 2009). This information can result in a higher school effectiveness, which should lead to improvements in school performance and therefore school quality (Schildkamp et al., 2009b). By implementing auditing, the current situation of schools will be determined. Before the audit team will enter the school, the self-evaluation, based on data, will be read. After the audit, the advice of the audit team will focus on how to improve the quality to reach the target situation. The aim of the audit team is advising how to improve the scores in the self-evaluation report and as a result the quality of that specific school.

Various school self-evaluation methods have been developed and executed to support school quality care (Schildkamp & Visscher, 2009). Studies about the use of these self-evaluation methods showed that the use of the outcomes of self-evaluations vary in the degree they are used to develop

quality of schools. Important factors of this variation are attitude towards evaluating, capacity of school inventiveness and the extent the requests of the teachers are addressed by the evaluation outcomes (Schildkamp et al., 2009a). Research showed that the Dutch self-evaluation method, ZEBO, had a positive effect on consultation, interaction and reflection of teachers. Moreover, an increase of focus on outcomes was reported as well as more adaptive classroom activities, more advanced activities of the principal and an increased amount of professional development activities. When this leads to changes in education processes, this might result in adjustments in student outcomes (Schildkamp et al., 2009b).

This school year, Quo Vadis will implement the audit systematic as their (self-)evaluation method to improve school quality. The school will fill in a self-evaluation, a format set up by indicators of the Education Inspectorate, before the audit and the audit team will fill in the same evaluation method (their audit framework) during the audit. Afterwards, the results are compared. The audit systematic is defined as an instrument for individuals or organizations to reflect education like a mirror (De Boer et al., 2013). Afterwards, the individual or organization can improve the process of development. The audit systematic has two aims. Firstly, to develop and implement a strong form of reflection within the organization. Secondly, further strengthening the quality management systematically in organizations. The audit systematic exists of three steps: preparation, implementation and reporting (Quo Vadis, 2015). The preparation contains an intake with the school and the preparation of the audit team on the implementation. During the implementation, the audit team meets the school team, reviews documents, visits and observes classrooms and has conversations with different stakeholders. In the end of the day an oral preliminary feedback will be given. Afterwards, a report based on the outcomes will be written. The audit team aims to use a framework existing of components of the framework of the inspection. However, a framework for data driven teaching is not developed yet. How to assess data driven teaching during these audits will be explored in the second part of the study.

2.3 Framework Inspection

Since the audit team aims to use the framework of the Dutch inspection for their evaluation of school quality, this section will explore the components in this framework and their link with data driven teaching. The current framework of the inspection contains four themes with in total nine quality aspects (Education Inspectorate, 2012b) and is shown in Table 1.

Table 1. *Themes and Quality Aspects of Inspection Framework.*

<i>Theme 1</i>	<i>Outputs</i>
Quality aspect 1	The outputs are on the level that can be expected on the basis of the characteristics of the student population
<i>Theme 2</i>	<i>Educational learning process</i>
Quality aspect 2	the offered curriculum prepares students for further education and society
Quality aspect 3	that teachers give the students sufficient time to internalize what is described in the curriculum
Quality aspect 4	the school climate is characterized by safety and respectful behaviour
Quality aspect 5	teachers explain clearly, organize the educational activity efficiently and keep the students involved in the task
Quality aspect 6	teachers adjust learning content, instruction, processing and learning time to differences in development among the students
<i>Theme 3</i>	<i>Care and guidance</i>
Quality aspect 7	teachers are monitoring systematically the progress of the students
Quality aspect 8	the students who appear to be in need of extra care, receives this
<i>Theme 4</i>	<i>Quality care</i>
Quality aspect 9	the school has a system of quality care

Source: Education Inspectorate (2012b)

Quo Vadis uses these themes and quality aspects to conduct (self-)evaluations of education. Principals have to evaluate the schools on these various aspects. To determine the effectiveness of data driven teaching, the audit is supposed to focus on quality aspect 1, 6, 7, 8 and 9. These aspects are introduced in the FOCUS-project as well (Visscher, Peters & Staman, 2010). In the FOCUS-project teachers learned to use ParnasSys (quality aspect 1, 7) and group plans (6, 8 and 9). The other quality aspects are not relevant for assessing data driven teaching.

Moreover, the inspectorate created specific indicators to determine to what extent schools are using data driven teaching (Odenthal & Verbeek, 2014). These indicators are mainly focussing on evaluating the progress of students (Table 2).

Table 2. *Indicators Data Driven Teaching.*

Indicator 1	The use of a student monitoring system, like ParnasSys to determine results of students.
Indicator 2	Systematically following and analysing progress in combination with the student monitoring system.
Indicator 3	Evaluating the effects of additional care of students which students receive based on (expected) failure on the basis of their performance.
Indicator 4	Evaluating the results
Indicator 5	Evaluating the educational learning processes by explaining the results of the students by determining the effectiveness of given education rather than student characteristics.

Source: Odenthal & Verbeek (2014)

The inspection thinks data driven teaching is ‘the key to educational improvements’, due to the fact that when teachers are using these five indicators their education as well as the student results will improve. Furthermore, the Education Inspectorate (2013) showed in the report of 2012 that weak and very weak schools score extreme low on these five indicators. In the second part of the study how to assess data driven teaching effectively during the audits will be determined by focussing on the framework of the inspection and the indicators.

2.4 Conclusion Theoretical Framework

Data driven teaching is the main concept of this survey. By data driven teaching systematic and purposeful working to maximize the performance of students is meant (Education Inspectorate, 2010). The FOCUS-project was introduced to teach school staff to apply data driven teaching by learning how to interpret analysis reports in ParnasSys, make group plans and use the four steps of Keuning & van Geel (2012). The audit systematic is used by Quo Vadis to observe how teachers apply data driven teaching in practice. The Dutch inspectorate introduced guidelines for data driven teaching which will be used in this study for designing a framework for the audits.

2.5 Scientific and Practical Relevance

Creating an effective instrument to determine to what extent data driven teaching is applied in daily practice is of scientific relevance for the audit systematic, since the use of audits is upcoming nationally (PO-raad & Education Inspectorate, 2015). The existence of one effective evaluation method, an audit framework, might improve the quality of the audits and the comparability of the results of different schools. Furthermore, for practical relevance, primary schools might acquire advantage of the knowledge how to measure data driven teaching when audits will be implemented as an evaluation method within their school board. Schools know on which aspects of the audit framework improvements should take place before the audit will be performed. Furthermore, Quo Vadis invested in 2010 in the implementation of data driven teaching. At present, it is most relevant

for the school board to know to what extent teachers are actually able to use and are implementing the audit systematic and how the use can be improved in practice to get most benefits of this investment.

3. Part I: Evaluation of Ability, Vision and Experiences of Teachers

Quo Vadis invested in the implementation of data driven teaching for improving quality of the schools. Now, 6 years later, the school board aims to know to what extent teachers are actually able to use their student monitoring system, ParnasSys, and what the vision and experiences of the teachers are with regard to data driven teaching are. In part IA the first research question and in part IB the second research question of the study is stated. In each part, the design and the method of performing the study are provided. Thereafter, the results are presented. Finally, the results are concluded and discussed.

3.1 Part IA: Evaluation of Ability of Teachers

3.1.1 Design and Method

The theoretical framework described that in the FOCUS-project teachers learned to use data from student monitoring systems like ParnasSys, the system schools of Quo Vadis uses. The aim of the project was to improve the quality of the instructions and the performance of the students. Research showed that the training had a beneficial effect on data driven decision making knowledge and skills of the teachers. Furthermore, both pre-test and post-test showed high attitudes towards data driven decision making during the FOCUS-project (Staman, Visscher & Luyten, 2014). Quo Vadis aims to know if the teachers within the school board still possess those knowledge and skills obtained during the FOCUS-project (Figure 3). In this part of the study the following research question will be explored:

Research Question 1: To what extent are teachers of Quo Vadis able to use ParnasSys for implementing data driven teaching?

Quo Vadis aims to know if this extent of ability is lower, equal or higher than the scores of the post-test of the FOCUS-project and if there is a difference in score between teachers who participated in the FOCUS-project and teachers who did not. Furthermore, Quo Vadis is interested in differences in the extent of ability to implement data driven teaching between teachers of different ages and teaching in different grades. Moreover, the study will show if there are difference in amount of errors between different categories of analyses. The different categories questioned in this study are a cross-section of student performance of all groups at one moment, trend analysis of one specific year, trend analysis within a group of students and performance growth. Therefore the first research question can be divided in five sub-questions:

Sub-question 1: *How are teachers of Quo Vadis scoring on the test in comparison to the FOCUS-project?*

Sub-question 2: *Is there a difference in extent of ability to implement data driven teaching between teachers who did participate in the FOCUS-project and teachers who did not?*

Sub-question 3: *Is there a difference in extent of ability to implement data driven teaching between teachers of different ages?*

Sub-question 4: *Is there a difference in extent of ability to implement data driven teaching between teachers providing education to different grades?*

Sub-question 5: *What is the difference in amount of errors between different categories of analyses?*

Hypothesized with respect to the first sub-question is that teachers are scoring equal or higher than the post-test of the FOCUS-project, since Desimone (2002) claimed that the implementation of an improvement can take years and therefore, the results are not directly measurable. Now, several years later, the results should be measurable. With regard to the second sub-question is expected that teachers who did participate in the FOCUS-project will score higher than teachers who did not participate. Moreover, expected is that younger teachers are scoring higher on the test, since teachers older than 40 years significantly differ in their cooperation in innovation (Berends, Bodilly & Kirby, 2002) and younger teachers or teachers with less experience are more open to innovation than more experienced teachers (Desimone, 2002). With respect to the fourth sub-question it is hypothesized that teachers of higher grades are scoring higher, since more data of students are available in higher grades. Moreover, it is hypothesized that the analysis that is performed most by teachers will have the least of errors in the questionnaire. The interviews will show which analyses is performed most by teachers. Expected is that the performance growth is used most often.

3.1.1.1 Design

The study conducted in this part, is an evaluation based mixed-method study. In this first part of the research quantitative data was gathered for evaluating the effects of the FOCUS-project. The ability of teachers to use ParnasSys was assessed quantitatively in a questionnaire by asking the same questions as in the post-test of the FOCUS-project. Therefore, the results of the questionnaire then and now can be compared and the effects can be evaluated.

3.1.1.2 Respondents

All teachers within Quo Vadis were approached for the questionnaire (N≈400). The teachers were approached by the principals of the schools. The school board of Quo Vadis is frequently in contact with the principals and these leaders are stakeholders of this study. The principals can explain the importance of the study for their education to motivate the teachers to participate. The response was supposed to be teachers of different ages, grades and schools to have a maximum variation that

represents the whole population of teachers within Quo Vadis (Onwuegbuzie & Leech, 2007). In case of low response, principals were asked to motivate teachers more by showing the importance of the study. 63 teachers filled in the questionnaire. In Table 3 the age of the respondents, information about the grades the respondents provide education to and how many of the teachers participated in the FOCUS-project are presented. An overview of the distribution of the entire population teachers in Quo Vadis is not available at the school board. Expected is that most teachers working for Quo Vadis are in the category 30-44 and 45-59. The range of the 18-29 group is smaller than the previous mentioned groups, since within Quo Vadis there are no teachers younger than 21 working. The range of 60+ teachers is smaller as well, since teachers are working till a maximum of 67 years old. In Table 3 these expectations are visible, since most respondents are in the 30-44 and 45-59 category. Within Quo Vadis no precise information is available about how many teachers are providing education to which grade. This is because some of the teachers is teaching more than one grade. The respondents are not equally distributed over the different grades. Most participants in the questionnaire are teaching in grade 1/2. However, every grade is represented by more than 10 participants and there are no large differences in amount of participants. Furthermore, Table 3 shows that 43 of the respondents participated in the FOCUS-project and 20 respondents did not participate.

Table 3. *Information Respondents Questionnaire*

	Frequency	Percent
<i>Age</i>		
18-29	5	7.9%
30-44	37	58.7%
45-59	18	28.6%
60+	3	4.8%
<i>Grade Providing Education to</i>		
Pre-schoolers	13	20.6%
Grade 1/2	21	33.3%
Grade 3/4	10	15.9%
Grade 5/6	19	30.2%
<i>Participating FOCUS-project</i>		
Yes	43	68.3%
No	20	31.7%

3.1.1.3 Instrumentation

For answering the first research question a survey was conducted about the use of ParnasSys (Appendix 1). In this survey questions about interpretations of analyses in ParnasSys were asked. The

same questions as the post-test of the FOCUS-project were used. These analyses were about graphics teachers learned to use and interpret in the project, like a cross-section of student performance of all groups at one moment, trend analysis of one specific year, trend analysis within a group of students and performance growth. The first questions are about A, B, C, D and E and I, II, III, IV and V-scores. Some of the schools are still using A, B, C, D and E-scores in practice. The ambition is to move over to I, II, III, IV and V-scores nationally. The difference between these two types of scores is that the I, II, III, IV and V-scores all represents 20% of the population of students. Students with a I-score are the best 20% of the whole population. In contrast, A, B and C are representing 25% of the population and D(15%) and E(10%) together 25%. So, students are differently distributed in these two systems.

3.1.1.4 Procedure

To collect data for the first research question the questionnaire was sent via Qualtrics (link: https://utwentebbs.eu.qualtrics.com/SE/?SID=SV_0IHxw6VmosMJ0Vv) to the teachers digitally. The principals informed the teachers about the purpose of the study beforehand. Furthermore, the principals explained that the questionnaire should be filled in individually and that the answers would not lead to individual consequences. However, the questionnaire was not completely anonymous, since for selecting teachers for interviews the researcher had to know who filled in the questionnaire. The duration of the questionnaire was about 15 minutes. No informed consent was used, because the participant could decide by receiving the questionnaire to participate or not. If participants were interested, insight in the data could be gathered by contacting the researcher.

3.1.1.5 Data analysis

For analysing the questionnaires percentages were calculated in SPSS. These results were compared to the post-test of the FOCUS-project, when these analyses were performed as well. It was hypothesized that teachers would score comparable to, or significantly higher than, the post-test scores in the Focus-project. Furthermore, the percentages correct answers of the teachers who participated in the FOCUS-project were compared to all respondents of the questionnaire. Moreover, differences between older and younger teachers and teachers in different grades were measured as well as differences in amount of errors between different categories of analyses.

3.1.2 Results Research Question 1: Ability of Teachers to use ParnasSys

In this section the results of the questionnaire are provided to answer the first research question about the extent the teachers of the primary schools are able to use ParnasSys. First, the percentage of errors in the overall test were calculated. Then, per category the errors were measured to evaluate the difference of difficulty between the analyses. Moreover, differences in the amount of errors between older and younger teachers were provided. Last, the differences in the amount of errors between teachers in different grades were given.

In Table 4 the percentage correct interpretation of the analyses in the questionnaire of all teachers participated is provided. Results shows that in average teachers answer 74.9 % of the questions correctly. At least one teacher answered all questions correctly and the teacher(s) with the lowest score, answered 41.7 % of the questions correctly. Moreover, the percentage correct interpretation of only the teachers who participated in the FOCUS-project is provided. Results shows that the minimum and maximum score are equal to the results when all teachers are taken into account. However, the mean of 76.9 correct answers is a little higher. Furthermore, the results of the teachers who did not participate in the FOCUS-project are provided. These group of teachers scored lower than the teachers who did participate in the FOCUS-project. However, this difference was not significant ($p = .111$).

Table 4. *Percentage Correct Interpretation Analyses Questionnaire*

	N	Minimum	Maximum	Mean	Std. Deviation
Percentage correct answers all teachers	63	41.7	100.0	74.9	15.1
Percentage correct answers teachers participated in FOCUS-project	43	41.7	100.0	76.9	14.6
Percentage correct answers teachers not participated in FOCUS-project	20	50.0	100.0	70.4	15.4

In Table 5 the results of the FOCUS project in 2010-2011 and 2011-2012 are provided. In the results of 2010-2011 only teachers of pre-schoolers till grade 3 are examined. Only results of teachers who made the ParnasSys-version of the test are provided, since the FOCUS-project focussed on the student monitoring system ESIS and CITO as well. Results showed that teachers scored 44 percent correctly in the pre-test of the project and 63 percent correctly in the post-test. Table 4 showed that now, 5 years later, teachers of Quo Vadis scored 74.9 percent correctly. In the results of 2011-2012 only teachers of grade 4, 5 and 6 are examined. Results showed that teachers scored 60 percent correctly in the pre-test of the project and 68 percent correctly in the post-test. The difference between 68 and 74.9 is significant, since the $t = 2.56$.

Table 5. Results FOCUS-project (Staman et al., 2014).

Participant	N	Pre-test mean in percent	St. Deviation	Post-test mean in percent	St. Deviation
Teachers pre-school, grade 1 (2010/2011)	79	44	18.2	63	14.3
Teachers grade 4, 5 and 6 (2011/2012)	94	60	18.5	68	13.6

In order to answer sub-question 1.3: *Is there a difference in extent of ability to implement data driven teaching between teachers of different ages?*, the difference in amount of errors in the questionnaire were calculated for teachers of different ages. Thereafter, ANOVO was calculated and showed no significant difference between groups ($F=1.923$, $p=.136$).

Table 6. Difference Correct Interpretation between Age.

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	1255.900	3	418.633	1.923	.136
Within groups	12841.279	59	217.649		
Total	14097.179	62			

In Table 7 the difference in percentage of correct answers between teachers of different ages is provided.

Table 7. Percentage Correct Answers

	N	Minimum	Maximum	Mean	St. Dev.
<18	0				
18-29	5	50.0	75.0	63.3	11.2
30-44	36	50.0	100.0	75.7	14.8
45-59	18	58.3	100.0	78.2	14.0
60+	3	41.7	91.7	63.9	25.5

In order to answer sub-question 1.4: *Is there a difference in extent of ability to implement data driven teaching between teachers providing education to different grades?*, the difference in amount of errors in the questionnaire were calculated for teachers providing education to different grades. Thereafter, ANOVO was calculated and no significant differences were found ($F=.336$; $p=.799$).

Table 8. *Difference Correct Interpretation between Grades.*

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	236.766	3	78.922	.336	.799
Within groups	13860.413	59	234.922		
Total	14097.179	62			

In Table 9 information about the errors of teachers in the different grades is provided.

Table 9. *Percentage Correct Answers*

	N	Minimum	Maximum	Mean	St. Dev.
Pre-schoolers	13	50.0	100.0	78.2	16.9
Grade 1/2	21	41.7	91.7	73.0	13.2
Grade 3/4	10	50.0	100.0	75.8	19.0
Grade 5/6	18	50.0	91.7	74.1	14.8

In order to answer sub-question 1.5: *What is the difference in amount of errors between different categories of analyses?*, the scores for questions about different categories of analyses were calculated and shown in Table 10. The first two questions in the questionnaire were about the interpretation of A, B, C, D and E scores and I, II, III, IV and V scores. The next two questions were testing the knowledge of teachers about cross sections. Then in three questions the ability to interpret trends of several groups was tested. In the following two questions the interpretation of trends of one class was assessed. Finally, in three questions the ability to interpret performance growth was tested. Moreover, the mean of correct answered questions highest for interpreting the performance growth (Mean=93.122). Interpreting CITO-scores seemed to be most difficult for the teachers of Quo Vadis (Mean=62.698).

Table 10. *Percentage Correct Interpretation per Category.*

Ability	N	Minimum	Maximum	Mean	St. Deviation
CITO-scores	63	0.00	100.00	62.698	33.563
Cross sections	63	0.00	100.00	77.778	30.819
Trends several groups	63	0.00	100.00	65.609	31.661
Trends one group	63	0.00	100.00	71.429	27.989
Performance growth	63	33.33	100.00	93.122	14.857

3.1.3 Conclusion and Discussion Research Question 1: Ability of Teachers to use ParnasSys.

The main conclusion with respect to the ability of teachers to use ParnasSys is that the teachers score higher than the post-test of the FOCUS-project in 2012. So, their ability to interpret the analyses in ParnasSys has increased. With respect to the correct interpretation of the analyses in ParnasSys it was expected to get equal or higher results than in the post-test of the FOCUS-project. Results showed that teachers of Quo Vadis scored higher (74.9 %) now than in 2011 (63 %) and 2012 (68 %). The difference between 68% and 74.9% showed to be significant. This means that teachers of Quo Vadis improved their skills significantly with respect to interpreting results in ParnasSys. However, teachers participated voluntarily in this questionnaire and the FOCUS-project was obligatory. What might have influenced the results is that just teachers who feel able to make the analyses participated in this questionnaire and less able teachers did not.

Category analyses showed that interpreting performance growth is most easy for the teachers. The standard deviation is the lowest for this category, which means that the abilities of the teachers are most in line with respect to this category. This is in line with the hypothesis that analysis performed most shows the least errors in the questionnaire. Interpreting CITO-scores such as A, B, C, D and E-scores and I, II, III, IV and V-scores scored lowest of all categories and seemed to be the most difficult category for teachers.

Hypothesized was that younger teachers would score higher than older teachers, since Berends et al. (2002) stated that teachers older than 40 years significantly differ in their cooperation in innovation. Results showed that this hypothesis can be rejected, since there seemed to be no significant differences between age. However, in the age 18-29 only 5 teachers and in the age 60+

only 3 teachers participated in the questionnaire. Therefore, the reliability of this conclusion can be discussed.

Finally, what can be concluded is that no significant differences are found between teachers teaching in different grades. This result might be the effect of the limited amount of teachers in some of the grades. Moreover, some teachers are teaching to a combination of grades. When the combination was grade 6-7 for example, the teacher had to choose between grade 5/6 or grade 7/8. In future research, the grades should be provided separately and the teachers should be able to check more than one grade in the questionnaire.

The main question of this part of the study was to what extent teachers of Quo Vadis are able to use ParnasSys for implementing data driven teaching. The answer to this question is that teachers of Quo Vadis are more able to use ParnasSys for implementing data driven teaching than in the post-test of the FOCUS-project. Furthermore, teachers who participated in the FOCUS-project scored higher than teachers who did not participate. Moreover, teachers scored best on interpreting the analysis of performance growth. Furthermore, no distinction between age and ability, as well as between teaching in which grade and ability could be made in this study. In future research this study can be performed by questioning more teachers. Then, more reliable inferences can be made.

3.2 Part IB: Evaluation of Vision and Experiences of Teachers

3.2.1 Design and Method

Besides the knowledge of the teachers as studied in part IA, Quo Vadis aims to know what the vision and experiences of the teachers are with regard to data driven teaching. In this part of the study the following research questions will be explored:

Research Question 2: What are the vision and experiences of teachers of Quo Vadis with regard to data driven teaching?

Hypothesized with respect to research question 2 is that not all analyses learnt in the FOCUS-project are applied in practice. Moreover, expected is that younger teachers have a more positive vision on data driven teaching than older teachers.

3.2.1.1 Design

The vision and experiences of teachers with regard to data driven teaching was assessed qualitatively by conducting interviews and contains a descriptive study design.

3.2.1.2 Respondents

Teachers of different ages, groups, schools and gender were approached to participate in the interview. 12 teachers were approached and 9 of them participated in the interviews. These were teachers who filled in the questionnaire earlier in the study. Therefore, the number of errors in the questionnaire were taken into account as well. Teachers with a low amount of errors, a high amount or average were invited to participate in the interview. In total 12 errors could be made. Furthermore, some teachers who did not participate in the FOCUS- project were invited. Table 11 shows an overview of characteristics of the participants in the interviews.

Table 11. *Information Respondents Interviews*

	Frequency
<i>Gender</i>	
Male	3
Female	6
<i>Age</i>	
18-29	2
30-44	3
45-59	2
60+	2
<i>Participation in FOCUS-project</i>	
Yes	7
No	2
<i>Amount of errors (maximum of 12)</i>	
1	2
2	2
3	1
4	2
5	2

3.2.1.3 Instrumentation

For answering the second research question interviews were conducted by asking questions about promoting factors, data analyses and data purposes (Figure 2) and steps of data driven teaching (Figure 1). The coding scheme (Appendix 2) is based on these figures and will structure the conducted interviews. The interview schedule is documented in Appendix 3.

3.2.1.4 Procedure

To collect data about the vision and experience of the teachers, nine teachers with an amount of errors in the questionnaire that is representative for all teachers who filled in the questionnaire were asked to participate. Furthermore, the questionnaire contained questions about their age, schools and grade they provide education to. By use of this information, teachers of different ages, groups, schools and gender

were mailed to participate in the interview. The interviews were recorded and transcribed afterwards. Then codes were assigned to the sentences.

3.2.1.5 Data analysis

For analysing the conducted interviews, codes were assigned to the sentences by the use of Figure 1 and 2. Since there was one rater, no inter-rater reliability was calculated.

3.2.2 Results Research Question 2: Vision and Experiences of Teachers

In this section results to answer the second research question, *What are the vision and experiences of teachers of Quo Vadis with regard to data driven teaching*, are shown. Since most interviewed teachers participated in the FOCUS-project, the main focus of the interviews is on how teachers experienced this training and what their vision and experiences are with what was learnt in the FOCUS-project. This section is divided in the steps of Keuning & van Geel (2012): evaluating and analysing results, setting SMART and challenging goals, determining strategy for goal accomplishment, executing strategy for goal accomplishment and the heading FOCUS-project. The promoting factors of Schildkamp et al. (2012) were used for formulating questions for the interviews.

First, the interviews showed that by every teacher the internal coach was mentioned as data expert. The data expert is the person in the school the teachers can ask questions about data driven teaching. Several teachers mentioned the ICT-specialist in the school as expert in specifically ParnasSys.

'The ICT's is for everything about working with ParnasSys. The internal coach is responsible for the quality of the documents we put in ParnasSys and the continuation of data driven teaching'.

What the internal coach does within schools differs. Mentioned activities are: monitoring results over several years, keeping track of scores with respect to norms set by the inspection, presenting results in team meetings, making graphs on school level, support teachers using information in ParnasSys, introducing new colleagues in data driven teaching and guiding conversations about results on group level. So, this promoting factor is sufficient within the schools of the interviewed teachers.

Step 1: Evaluating and analysing results

In this first step of the cycle learnt in the FOCUS-project, the main focus is on the analyses conducted by the teachers to evaluate and analyse the outcomes of students. In this section a description of the performed analyses is offered as well as improvements mentioned by the teachers and good practices within the schoolboard Quo Vadis. By good practices, schools that are good examples for other schools is meant.

Performed analyses

First, the DLE was mentioned to be used to see where children are in their development. The DLE-score is the amount of months the students received education from grade 1. When a student is in the beginning of grade 2, the DLE is supposed to be 10 months, since that is the amount of months a student receives education in one school year.

'When the student is supposed to be at 40 and is at 35, then the student has a lag of 5 months education'.

The DLE is often used for explanation to parents, since performance growth is a more abstract number than DLE. The amount of months is for parents more easy to understand. Performance growth is by almost every teacher used in the group plan as a goal for the next period. This number differs between A, B, C, D and E scoring students. After a period is assessed what the 'performance score' of a student is on a specific topic and if this growth is adequate to what was expected.

'Now, we use the outcomes more often and see what to do with it. Formerly, you had A, B, C, D and E-scores and you thought o A and B is okay, let's focus on C, D and E. Now, you are more aware of that C group and on you pay more attention to if every students has grown on his or her own level'.

Furthermore, the error analysis was often mentioned in the interviews. Error analyses, learnt to apply in the FOCUS-project, are used often to analyse in which subcategory errors are made an to provide specific additional instruction. For example when a student is scoring insufficient on a math-test and the teacher aims to know what kind of errors are made, an error analysis is performed. The category 'plus sums' might be made without errors, while the 'minus sums' might be all wrong. Then the teacher knows that the additional instruction should be on 'minus sums' and not on all categories of the test.

So, DLE, performance growth, A to E (or I to V) scores and the error analysis are used most often to evaluate and analyse the results of the students.

Improvements for evaluating and analysing results

In the interview teachers mentioned improvements to make evaluating and analysing results more easy. First, teachers mentioned that the student monitoring system, ParnasSys, is not linked with for example Snappet. With Snappet, students work on their ipad and the ipad analyses the results directly. These results must be entered manually to ParnasSys. This applies to textbook based tests as well. Textbook based tests are tests based on the content in the textbook of that grade. Every school is free to choose which textbook to use and therefore textbook based tests are not the same in every school in contrast to CITO-tests which are national tests and made by every school.

'When I examine a test now and I register this in for example Wereld in Getallen for mathematics, which is actually an enormous job, I have to register 8 sums per test for 27 students and then I have to register the final score in ParnasSys'.

Furthermore, a teacher who works with Snappet stated not to know how to put the scores of Snappet in a reliable way in ParnasSys. The coordinator of language figured that out.

'Now we have for example 150 points. Now, we make other grades of that and register this in ParnasSys. Who has a 10 has 100 points and who has a 8 scored 80 points. Then we come closer to a more reliable score'.

However, the teacher claimed that the score does not fit perfectly. Some students have difficult items and others more easy items, since Snappet is an adaptive test instrument. More research should be performed about the reliability according to the teacher. In short, interviews showed that teachers are not aware about the reliability of the data.

Moreover, teachers mentioned not to be able to make new headings in ParnasSys. Therefore, teachers only can register CITO-scores and think ParnasSys is not accurate enough in showing data. Teachers like ParnasSys to be more specific, for example in mathematics

'I would like results to be more divided in categories, per category you have to make an error analysis'.

Some schools claim they only can register CITO's in ParnasSys, other schools already make new headings and therefore can register all grades. This saves time with respect to creating reports, since stated is that in ParnasSys reports of the students can be shown automatically when all marks are filled in. Now, some teachers still write down the marks on paper and calculate the mean in the end of a period.

'for each report period, the system accurately computes the averages and you do not have to calculate all averages by using the calculator'.

Furthermore, something that makes the use of ParnasSys more difficult is that ParnasSys is used nationally. Therefore, there are many buttons that are not useful for that specific school. This leads to more difficulty in access to the specific analysis the teacher would like to view.

'There is for example buttons of other places, like FOCUS but then in Utrecht. You have to search what you need'.

On the question how can the tools for data driven teaching be improved, some teachers answered there is already developed a lot where they do not know anything about yet, so they did not dare to mention improvements. Moreover, Snappet can offer more than now is used in schools. Furthermore, schools who are printing the reviews of students refer to the ease of this and teachers who are not using this at the moment prefer to do this in future.

Moreover, one of the older teachers claimed that learning new things in ParnasSys takes a lot of time. Therefore, working with younger teachers, who are quicker saves time. Furthermore, older teachers stated that the requirements of current education are much higher than earlier. Registering is

now more easy than formerly, since there are computers now. Furthermore, when there are changes in ParnasSys teachers react differently.

'We have to figure the changes in ParnasSys out for ourselves and honestly, I am not doing that anymore. If I have to know it, I hear it from a colleague. I have a younger teacher working next to me. I rather sit next to her, since it takes me a lot of time'.

Good practices of evaluating and analysing results.

Some of the schools already saves the absence of students, conversations about a student and specific plans in ParnasSys. Not all schools are doing this at the moment. One of the schools even open these conversations for the parents.

'In principle teachers have the rights to read them. However, teachers have to learn to formulate these conversations differently'.

ParnasSys is always available, so when a teacher is at home, the system is accessible. This is an advantage for example for new teachers who can read about the new group before starting.

Step 2: Setting SMART and challenging goals

When the results of students are evaluated and analysed, SMART and challenging goals should be set. Since Snappet, a digital program to learn instead of using textbooks, is setting goals for each specific student, this section is divided in two parts. First, information about what is studied on school-level will be showed. Then, Snappet will be discussed.

School-level

In this section the vision, norms and goals set on school-, group- and student level are meant. Schools are mainly focussed on CITO's, since these are criteria schools are assessed on by the inspectorate.

'We work towards CITO's, since group plans are based on that. We look at how the CITO-results can be optimal by working towards goals set by the SLO'.

The internal coach looks if there is a shift in I, II, III, IV and V- scores. Some schools are using A, B, C, D and E-scores as mentioned before. The goal is to have 80% in an A or B-score. And in group plans is mentioned that A and B- scoring children should have 90% correct and C 80% etcetera. Moreover, in group plans goals are stated in terms of performance growth. However, when the goal is not reached often no action is taken.

'We try to boost it up, but that does not work out, since there are very weak students'.

The method LeerKRACHT was often mentioned as a method to share the vision of the team and set goals. In these team meetings all kind of topics are discussed. Teachers mentioned that the analyses of outcomes of students are discussed in these meetings as well. When there is a problem, this is discussed in the LeerKRACHT meeting. Goals are set and teachers decide when this goal should be reached.

Mostly, the goals in the group plans are in terms of performance growth or percentage good answered questions.

'For example in 6 weeks the child should know half hours and quarters. That is what we write in the group plan'.

Most times 80 percent correct answers is a goal for textbook based tests. Teachers sometimes experience the difficulty of deciding which goal to set if CITO's are good and in textbook based tests too many errors are made or the other way around.

The amount of times school set new goals differs. Some schools set new goals in their group plans twice a year while others evaluate and change goals four times a year.

'New group plans are made twice a year, but in the main time there is an evaluation based on textbook based tests'.

Almost every school makes a group plan for the teacher of next year by performing the error analysis of the last tests of the school year and the percentage correct answers. The teacher of next year can decide to adapt the plan or to use it directly by the start of the schoolyear.

Snappet

Teachers working with Snappet stated to have direct access to data. Teachers know directly of every student how the assignment was made. Moreover, students receive feedback directly by their tool, since after answering a question the screen will be green or red. If the question is not answered correctly, the students have to correct it immediately before getting on to the next question. Another advantage is that every student is working on their own level, whereby teachers have access to data of every student on their current level and working on their own goals.

Moreover, teachers differ in independency of the internal coach for setting goals.

'I think as a teacher you should be motivated to achieve your goals, then you don't wait for a conversation with the internal coach. In January the CITO tests were administered and now in April we had a conversation about results, then I should have to wait 2 months for my data. You should be internally motivated to reach your goal and then you will have a look at the data by yourself. I don't know if in this school every teacher does this when the internal coach does not deliver the data' / 'Some teachers are further than others, those have a waiting attitude'.

Schools using Snappet stated to directly receive feedback about the errors of the students. The programme makes an error analysis automatically. Thereafter, the teacher can specifically for each student open a set of exercises in Snappet or for the entire group when the whole group is not achieving the goals yet.

'These are the goals of my class, converting analog time system to digital. Here I can see this goals is not reached in this group. You can see differences in individual students as well. Per student or per group I can open exercises about this goal by the use of these results'.

Step 3: Determining strategy for goal accomplishment

Results showed that this step in practice means that teachers fill in their format of the group plan. So, there is a set format and by filling in each box, the group plan is finished. Some of those formats are very clear and others are not that common.

'When you come here for one day, that teacher don't have a clue what to do by using the method we have now'.

Just one school still uses the format of the FOCUS-project. Others transformed it into what is important for their school. The strategy consists of what are you exactly going to do, how to do that and what materials necessary to execute the strategy. Mostly, the group plan is transferred to the daily overview. In that overview is mentioned which students should pay extra attention to. This is with respect to additional care provided structurally. Sometimes a student only need to have additional instruction about a specific subcategory, such as the subcategory fractions in mathematics.

'When a B-scoring student does not possess one subcategory yet, this will be mentioned in the week overview. In the structural overview are children who score low in general and need additional instruction structurally'.

Furthermore, data analysis showed that with respect to time teachers mentioned that in particular the way of showing data in group plans can be shorter or may be abolished to save time:

'So, if I may decide group plans may be skipped or simplified anyway. Now, I make a group plan for three months and then I never look at it again. Why do I make them?'

Finally, what can be stated is that the oldest teacher is not seeing the point of a group plan, since formerly it did went well without such format. Stated is that more work is done for the same purpose. The difference that everything is digitally now and in the past this was on paper.

'I believe group plans should be as simple as possible. Only a few numbers should be added, since most important is how to trigger a student to do his work. More about the educational needs'.

Step 4: Executing strategy for goal accomplishment

This step means that teachers are actually acting out their group plan in practice. Teachers revealed during the interviews that a group plan is available, but that in many cases it is only stored in the computer and not a part of daily practice. In case of two teachers teaching one group, most times one of the teachers is responsible for maths and the other for language for example as mentioned before. This teacher is responsible for executing the strategy for accomplishing the goal. Moreover, in some cases teachers do not use these plans for practice at all, since they claim to know it by heart. The reason the plans are made, according to this teacher is, when a teacher gets ill, the substitute needs to know what to do. So, to save time, these plans can be shorter and more compact. A teacher suggested

to only register the organization of students and the evaluation of the plan in the group plan itself and to save time to put the basic rules, like methods used, in a schoolwide plan.

'The inspection is not requiring what we are actually doing now. The inspection demands for a form of reporting. This form can be specified for the school and should not be a trick you once perform for the inspectorate and is not actually used in practice.'

Furthermore, interviews revealed that schools differ in for which subjects group plans are made and therefore for which subjects schools work systematically on improving results. Some schools just started with mathematics, while others have group plans for mathematics, spelling, reading and social-emotional skills. Moreover, within Quo Vadis there are experts in different subjects like for example for mathematics. One of the mathematics coordinators of Quo Vadis was interviewed and mentioned that more collaboration between coordinators would be preferable and that more teachers within the school could appeal to her.

'Last, I had one question with respect to maths, but that is just one question. I think we can benefit more from it!'

Now, most collaboration takes place within the schools between teachers providing education to the same class and between the internal coach and the teachers. Teachers providing education to the same class make group plans together and most common is to divide subjects between the teachers. One of them is responsible for language and the other for mathematics for example.

'She keeps track of the results with respect to mathematics and I with respect to language. If we can we do something extra, but my main goal is language. This is how we did divide it.'

Both implement the plan of their subject and finally the evaluation takes place together. In the group folder there is a daily overview where teachers should report which children received additional instruction and if the goal is reached. However, in practice this is not always done. Therefore, colleagues in one group are not always up to date about what the other colleague did on their working days. Analysing the group plans and the results is often done together.

'I prefer to do this together. What do we have to do, what needs attention. Then, you better now what is happening in the classroom. Often this should be done in our own time. Mostly in the holiday we will be back for one day to do these kind of things.'

Finally, one of the teachers mentioned that the focus in daily practice should be more on action-oriented working instead of only data driven teaching. Now, the focus is mainly on the results. By action-oriented working the focus is less on results, but on the process to let the student perform as best as possible. The inspection is getting more process focussed as well.

'You have to evaluate what you are doing and if you really get the best out of your students. Not to score as high as possible, but is every student doing what is in his potential. The inspectorate is now more focussed on what is the process, how are you working, where are you supporting students, what are you doing to do the best for your students.'

In short, working with digital materials like Snappet was mentioned as a proper way of data driven teaching, since every step of Keuning & van Geel (2012) is in it. Students make their exercises, these exercises are evaluated by the system, then the teachers know which exercises are difficult for which student and makes a plan by opening new exercises on that topic for that student. Then, this programme will be executed by the system and the teacher receives feedback again and can make a plan again. Moreover, according to the teacher students prefer to receive feedback directly by the system and to work adaptively.

'The tablet assesses the student and gives harder questions or will provide exercise at a lower level'.

In conclusion, most teachers evaluate and analyse the results by monitoring the CITO-scores, checking the DLE or performance growth and making an error analysis. However, after the four steps of data driven teaching the results should be used to evaluate the plan made for goal accomplishment (step 3 of Keuning & van Geel (2012)). Mostly this is not performed adequately.

'In the group plan I should select if the student achieved the CITO goal and this should be based on performance growth, but I haven't done that. I select if they achieved what I expected'.

'By the evaluation we look if the goal is achieved or not and then new goals will be set'.

FOCUS-project

In this section, results are shown about how teachers experienced the FOCUS-project and what teachers have learnt. First, the overall vision and experiences with the project are described. Since most teachers mentioned the relevance and time worthiness of the project, the first part is about relevance and time. Thereafter, the knowledge and skills of teachers is discussed. Then, what teachers revealed about the analyses learnt in the FOCUS-project and questioned in Part IA of this study, is shown.

Relevance and time.

Most teachers participated in the FOCUS-training and mentioned the relevance of what was learned in this course.

'Every time we had to make homework assignments, whereof we thought: what is the relevancy of this. That is what we missed'.

This results in that not all what is learned is applied in practice. Moreover, the group plans were distributed to all teachers of different schools, but almost all schools adapted this to their own school. The content was not relevant for their population. Teachers expected to develop a group plan for their own school during the course. Moreover, teachers learned to make an error analysis in the FOCUS-

project. Teachers are using this in practice, since it is relevant for mainly the C, D and E scoring students. Not for all, since:

'You have to put a f for false or g for good after each question and that for 96 questions. I have 25 students, so 25x96 is about 2500 times. That is only relevant when you really want to know where the errors are'.

Furthermore, teachers stated they choose between DLE (didactical age in months) and not performance growth, since this is more relevant and understandable for parents. Performance growth is a more abstract number for parents. Moreover, teachers mentioned to know when which analyses was relevant. For example: one teacher mentioned that it is not relevant to make trend analyses over several years in some groups in that specific school, since some groups only exist of 5 students. Then the results of that specific analysis is less relevant than for groups with more students.

Furthermore, almost all schools changed the group plans, since the plan was not relevant for their school population. Teachers mentioned what was missing in the plans of FOCUS and then changed it school wide.

'We have rewritten the plan together, whereby the plan is more workable for our school'.

Last, the older teacher stated that she did not see the relevance of all that data use.

'When I think about the early days, when I started, I had one group and when I gave a test I saw what was going wrong. Then I choose additional assignments and gave additional instruction. Just in between lessons. I did not need a group plan. I think that is big nonsense and more work'.

Time was mentioned as well. When working with group plans it was discussed in the teams then the same information could be learned in three hours and specifically to the school.

'Now we were 5,6,7 or may be 8 meetings of 3 hours all together. Way too much, too crowded, not specified to the school. Then, when the training was finished, we have rewritten the group plans'.

Knowledge and skills.

Some teachers claimed not to necessarily need the FOCUS-training.

'The error analysis is an annoying job to do. You can see the groups you have to make, that is useful. But did I need the training? I think I could do it by myself'.

However, other teachers are less secure and are *'afraid for the unknown'*. Some teachers are insecure about doing the right thing in ParnasSys and to make changes that cannot be reversed.

The middle group in terms of age stated to have enough knowledge and skills to make group plans. The FOCUS-project was not needed for this purpose. The younger teachers stated, when not participated in the project, to miss knowledge and to hope for a training in the nearby future.

Moreover, it was stated that cross sections were practiced in the FOCUS-project, but some teachers

are still not skilled to use these. DLE is for teachers more easy to understand and to use. Furthermore, the knowledge about performance growth is varying.

'I have followed the FOCUS-training, but cross-sections and performance growth are concepts that in relation to schools can use some retraining'.

However, teachers stated that the training was more for internal coaches than for the entire school team. The most important things with respect to data driven teaching could be explained to the team by the internal coach. Now, many teachers were in one room and therefore no questions could be asked. Moreover, not all teachers use the analyses and those teachers receive the analyses by the internal coach. If this is a matter of knowledge or motivation is not clear. Furthermore, the teacher that did not participate in the FOCUS-project stated that by trying she learned to use ParnasSys.

'I think I am well aware about what is in ParnasSys by trying. However, I don't know for sure, but I think so. I can help myself by the things asked to do'.

Last, the team meetings in which analyses are presented by the internal coach, make teachers feel more skilled and knowledgeable. By trainings education the teachers receive about data driven teaching is meant. Mainly the training of FOCUS was mentioned in the interviews. What most teachers mentioned was the crowdedness of the training. Therefore, there was less room for asking questions and to apply the theory to the specific schools. Moreover, the training was quite theoretical, while teachers expected to learn how to use the analyses etcetera. Now, sometimes it was not clear how the theory should work in practice.

'All nice and sweet, but how does it work in practice after the training'.

Other trainings that were provided in schools were protocol ERWD (Ernstige RekenWiskunde-problemen en Dyscalculie) and was given by an expert in maths. Teachers learnt to perform a diagnostic math conversation with a child to see from concrete to abstract where errors are made. The teacher was positive, since the time was created to perform this conversation instead of doing this activity beside normal activities. Furthermore, this year the training was expanded by introducing new models. Moreover, EDI-trainings were provided in several schools of Quo Vadis. The EDI-model is a method of giving instruction and was provided to make instructions more effective. These two trainings were provided on initiative of the specific schools and not top-down from the school board.

However, teachers expect some more training with respect to changes in ParnasSys. Schools expect teachers to learn and stay up to date by themselves. Just very important changes will be mentioned in team meetings after a while.

'Last, the internal coach, principal and I had a seminar about Ultimview in ParnasSys. The teachers are not informed yet about what we have learnt. This still should be done'.

Finally, opinions are divided as regards trainings in future. Some teachers stated to stay informed on their own initiative, while others stated to prefer a refresh training with respect to analyses in ParnasSys.

'A refresh training would not be a mistake, since I use it too less. When you teach preschools, you only have twice a year a test. In higher grades this is used more often. But I am educated to provide education from pre-schoolers till grade 6, so when I have to teach grade 4 next year I have to work with it again'.

The teachers just graduated from teacher training college could benefit from a training as stated by a just graduated teacher, since training teacher college do not focus on data driven teaching. How to interpret outcomes of students is not taught.

Analyses learnt in the FOCUS-project.

In this section, the results about what teachers stated about the analyses learnt in the FOCUS-project and questioned in the questionnaire in part IA are shown.

Cross-section of student performance of all groups at one moment. Teachers monitor how many students are scoring in which category in terms of the ones mentioned before I, II, III, IV and V-scoring students or A, B, C, D and E-scoring students. Students score above average when they score a I, II or in the best half of the III-score or when a student scored a A or B-score. However, teachers are not monitoring the performance of all those groups at one moment. In practice teachers are not using the cross-section, since the teachers count the number of students in each scoring category manually. One teacher mentioned that in that specific school of all grades an overview is made about how many students are in which scoring category.

'A cross-section does not have an added value for you as teacher in daily practice'.

Trend analysis of one specific year. This analysis shows the outcomes of students in one specific grade over several years. For example how the students in grade 5 scored from 2010 to 2015 in mathematics. Each year a different group is monitored and those 5 different groups are presented in one graph. This kind of analysis was not mentioned by teachers, since the group of students differs each year. More useful according to the teachers is the trend analysis within a group of students instead of one specific year.

Trend analysis within a group of students. This analysis monitors the performances of a group of students for one specific subject, for example mathematics, from grade 1 to grade 6. In this analysis the same population is monitored for six years. The development of the students over the years in one subject is shown in a graph. This is performed by looking at CITO scores of the group and comparing the scores to the scores of the year before. Then, teachers ask themselves how possible differences can be explained and a plan is written how to increase outcomes. Furthermore, teachers can find in ParnasSys the average score of the whole group for a specific topic from grade 1 to 6.

'When the student is coming from D to C, then the development is good, but when the student is coming from a B, then it is an alarm signal and we have to analyse what happened. So, C is a group which needs a lot of attention'.

Performance growth. The performance growth is a number to indicate the performance of a student from grade 1 to grade 6. It is an number on a scale which provides the opportunity to compare the score of a test in grade 1 to a score in grade 6. How much the performance should grow is determined per subject and per grade. This is the analysis performed mostly according to the teachers. One of the teachers claimed this analysis was the only useful topic in the FOCUS-project.

'The only thing I still use is performance growth for CITO-tests within a C for example. You make a test and score a C, that is weak, but in relation to the previous test it looks like the child did not grow, but within that C score the student can be improved'.

However, as mentioned before, in conversations with parents DLE is used more often instead of the performance growth which is a more abstract score. In group plans performance growth is more common.

3.2.3 Conclusion and Discussion Research Question 2: Vision and Experiences of Teachers

In this section the results of the second research question, about the vision and experience of teachers with regard to data driven teaching, are concluded and discussed. The sequence of the interviews is maintained in this section as well. What in general can be concluded is that not all what has been learned is applied in practice. Moreover, the attitude to apply data driven teaching and to use ParnasSys is higher for younger teachers than for older teachers. With respect to the steps of data driven teaching (Keuning & van Geel, 2012) it can be concluded that not all steps are performed as intended. Results are often used for setting goals, but not adequately for evaluating the plan made for goal accomplishment. Furthermore, the goals are not always SMART and challenging. Moreover, the third step: determining a strategy for goal accomplishment is often carried out, since this needs to be in the group plan. However, this step feels more like administration, since often this is not used for the fourth step: executing a strategy for goal accomplishment. Simplifying the group plans was mentioned as a solution.

Step 1: Evaluating and analysing results. What can be concluded is that teachers only evaluate and analyse results when they think it is relevant and time worthy. Therefore, teachers prefer ParnasSys to become linked to Snappet, to save time with respect registering grades and creating reports. Moreover, one of the older teachers claimed that learning new things in ParnasSys takes a lot of time. This results in ignoring the updates and not staying up to date. A suggestion for the principal in each school is to assign one person who stays up to date with ParnasSys and inform the other teachers about this. With respect to data analysis can be concluded that in every school data analyses are performed in practice.

The choice of which analyses are performed is made in the schools. Not every analysis learnt in the FOCUS-project is applied in daily practice.

Step 2: Setting SMART and challenging goals. With respect to the vision, norms and goals of schools it can be concluded that the method LeerKRACHT is stimulating the creation and sharing of challenging goals. The goal of Quo Vadis already is to use this method in all schools. However, the vision and norms set on school-level seemed to be unclear to teachers. Furthermore, Snappet was mentioned as a helpful tool for setting student specific goals.

Step 3: Determining strategy for goal accomplishment. The strategy for goal accomplishment is in all schools stated in a group plan. What can be concluded is that teachers just want relevant information in the group plan and thereby these plans will be shorter and time will be saved. A suggestion for the principal is to ease the format of the group plan by evaluating with the team what is necessary for providing good education and what can be skipped. According to Porter et al. (1994) it is important to be clear in the school team about methods, instruction, etcetera. Therefore, the school board has to formulate their expectations about for which subjects (e.g. maths and reading) group plans should be composed in all schools of Quo Vadis.

Step 4: Executing strategy for goal accomplishment. When the group plan is made, often the strategy is not executed as intended. Teachers mentioned as reason to know it by heart and that the group plan is too extensive. Moreover, with respect to teacher collaboration it can be concluded that within schools teachers collaborate much together and teachers are satisfied with the collaboration. An advice is to optimize the collaboration of experts between the schools of Quo Vadis, since this appeared not to happen frequently. When in one of the schools a question is raised, the principal can invite an expert of another school to help.

FOCUS-project. With respect to the relevance of the FOCUS-project it can be concluded that teachers think that not everything what is learned was relevant and applied in practice during that training and afterwards. Especially, the group plans were considered too general. An advice for the school board Quo Vadis is to choose trainings in future that are more focussed on specific situations and that are not too general (Cooper, Slavin & Madden, 1998). Moreover, teachers mentioned the many irrelevant buttons in the system ParnasSys, like projects in Utrecht. This subverts the access to the necessary tools. Furthermore, what can be concluded is that the beliefs and motivation and knowledge and skills differs largely between teachers. Some teachers are highly motivated and belief that using data is useful and others are less motivated and doubt the usefulness. Therefore, since the internal coach seemed to be the data expert in every school, a suggestion is to train the internal coach in recognizing different behaviours of the teachers and guiding teachers in carrying out the vision of the school with

respect of data driven teaching. Taking into account the type of teachers is important in times of change (Berends et al.,2002). Furthermore, in the audit framework in part II, the criteria '*having a positive attitude*' is mentioned as well. The change should not be experienced as imposed, so the internal coach should learn how to create a positive attitude without imposing (Porter, Floden, Freeman, Schmidt & Schwille,1988). Finally, what can be concluded is that mainly the younger and older teachers like to have a refresh course. Quo Vadis might evaluate the need for this course in all schools and decide whether to take part in a course or not. In addition to this some teachers mentioned that the internal coach should have participated in the FOCUS-project and should train the team afterwards. However, other studies have shown that providing individual training or training to part of a team seemed to be less effective in making school changes (Bodilly, 1998). Furthermore, teachers expect some more training with respect to changes in ParnasSys. However, schools expect teachers to learn and stay up to date by themselves. ParnasSys organizes meetings when large updates are performed. An advice is to attend those meetings, since questions can be asked directly.

Finally, with respect to the analyses learnt in the FOCUS-project can be concluded that performance growth is applied most often. The trend analysis within a group of students is applied as well and seemed to be more relevant for teachers than the trend analysis of one specific year. Furthermore, in practice teachers are not using the cross-section, since the teachers count the number of students in each scoring category manually.

The main question of this part of the study was what the vision and experiences of teachers are with regard to data driven teaching. The answer to this question is that, as hypothesized, not all analyses learnt in the FOCUS-project are performed in daily practice. Teachers stated that only two or three of the analyses were actually used. By making the choice which analyses to use, teachers take the relevancy and time worthiness of the results of the analyses into account. Moreover, the hypothesis was that younger teachers have a more positive vision on data driven teaching. Results confirmed this hypothesis, since older teachers think it is hard to perform the analyses and in the past, without data driven teaching, education was good as well.

4. Part II: Development of an Audit Framework

With respect to the new inspectorate framework, Quo Vadis aims to take a step further in improving school quality. This year, the school will implement the audit method. During the audits the school board aims to know to what extent teachers are implementing data driven teaching. To determine the extent of implementation of data driven teaching, an assessment instrument should be developed. In this part of the study the third research question is examined. First, the design and the method of answering the question are specified. Thereafter, the results and design are provided. Finally, this part is concluded and discussed.

4.1 Design and Method

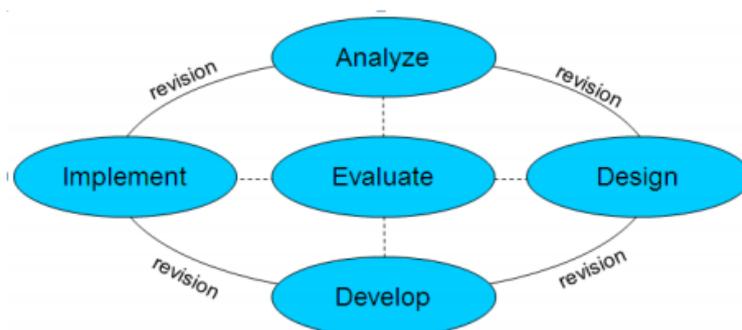
In the previous section it was determined to what extent teachers are able to use ParnasSys for data driven teaching. However, the school board aims to have a tool to measure if this knowledge is actually implemented in the schools or improvements could be made. The theoretical framework showed that for this reason Quo Vadis implemented the audit systematic. The audit systematic is defined as an instrument for individuals or organizations to reflect education like a mirror (De Boer et al., 2013). To improve quality of schools, self-evaluation might help to recognize problems and observe development initiatives (Schildkamp, Visscher & Luyten, 2009). After the self-evaluation of the school, the audit team will see if this self-evaluation matches their objective point of view. Therefore, in this second part how to evaluate data driven teaching during the audits will be investigated (Figure 4). For this study the following research question can be stated:

Research Question 3: *How can the implementation of data driven teaching effectively be assessed during the audits?*

4.1.1 Design

This second part of the study is a design based research. For determining how to assess data driven teaching during the audits, qualitative data was gathered by an exploratory research and an expert interview. Moreover, data was gathered by implementing and evaluating the prototypes of the audit framework during the audits and improving the prototypes. The design approach used for this design based research is the ADDIE-model (Gustafson & Branch, 2002) as provided in Figure 3. First, the context, content and already existing materials will be analysed by an expert interview and an exploratory research. Thereafter, by the use of the results of the analyses, guidelines will be designed. These guidelines are taken into account by developing the audit framework. The first prototype of the audit framework will be implemented and evaluated during an audit. The evaluation is used for the development of the second prototype. After the implementation and the evaluation of the second prototype the final audit framework is developed.

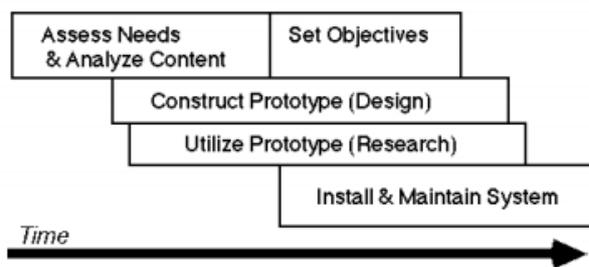
Figure 3. *ADDIE-model*



Source: Gustafson & Branch (2002)

Furthermore, for more specification about developing, implementing and evaluating as provided in the ADDIE-model, the Rapid-prototyping model is used (Tripp and Bichelmeyer, 1990) as shown in Figure 4. In the first place the needs of Quo Vadis are formulated and the content of data-driven teaching is studied more deeply in the theoretical framework and more intensely in the exploratory research. Moreover, by the use of interviews information about structuring the content and lay-out in an audit instrument was gathered. Thereafter, objectives were set in the form of guidelines. Then the prototype is designed and utilized. Last, the evaluation instrument is installed and maintained in the audit systematic.

Figure 4. *Rapid-prototyping model*



Source: Tripp & Bichelmeyer (1990) in Smith & Ragan (1999)

4.1.2 Instrumentation

To answer the research question an exploratory research of already existing evaluation methods and observation formats was conducted. Furthermore, an interview with an expert in developing audit schemes was conducted to develop and improve the prototypes. The expert is currently working as an educational advisor with a main focus on optimizing the quality of schools. He used to work as researcher in the educational field and directed many projects focussing on national innovation processes in primary, special and secondary education. Therefore, it is expected that this expert can provide useful information for developing an audit framework to improve the quality of the schools of Quo Vadis.

4.1.3 Procedure

The second part of the study, designing a framework for assessing data driven teaching, was carried out at the same time as the first part. The developed prototype of the audit framework was tested during the audits in lesson observations and interviews with the observed teachers and the internal coach. Afterwards, the prototype was evaluated. Thereafter, adjustments were formulated and carried out. The second prototype was tested and evaluated likewise. The feedback of this prototype was applied in the third and last version of the audit framework.

4.1.4 Data analysis

To answer the question how data driven teaching could be assessed during the audits, an exploratory research was conducted. Since the theoretical framework already showed important concepts for assessing data driven teaching, the focus of the exploratory research is how to present the concepts in an format effectively. In Table 1 and 2 (quality aspect of the inspectorate and indicators for data driven teaching) and Figure 2 (promoting factors for data driven teaching) in the theoretical framework, the content for the audit framework was provided.

Furthermore, an expert interview with an expert in developing audit schemes was conducted (Appendix 4). Data of the exploratory research and the interviews were combined and formulated in guidelines, and led to an audit framework for determining the use of data during the audits by using the content of Table 1 and 2. The audit framework was implemented during an audit, evaluated by the audit team and the audit expert and improved.

4.2 Results

The criteria the exploratory research and expert interview should focus on are the structure of the content and lay-out according to the expert. In this section, the results of the interview are shown first. Then, results of exploratory research are provided. Finally, the results of the interview and the exploratory research are formulated in guidelines for developing the audit framework.

4.2.1 Expert interview

Structure of Content. The interview with the expert showed that when an audit framework is made, using several resources is important. From all resources the Dutch inspectorate is most important, for two reasons.

‘Schools and therefore school boards are inspectorate minded. They know what the inspectorate is expecting from them and on which points schools will be judged. Secondly, the content argument, since the audit frameworks of the inspectorate are well formulated. They are performing scientific research in practice and therefore it is of good quality’.

The expert stated that when the inspectorate is not mentioned as source, schools asked the expert to implement indicators of the inspectorate yet. Moreover, other literature should be consulted. However, the trick is to find the main line.

‘Of several scientists you can get indicators, but then it won’t be workable in your audit framework. You have to decide for yourself where your focus is and that you have a well-balanced list of references’.

Often the audit framework is not finished in one time and the content should be adjusted stated the expert. Moreover, the expert stated that in the end the reliability of the audit framework cannot be exactly measured, since the results are dependent of the interpretations of the users.

‘It is important to check if the method is working in practice by for example using feedback of users and the schools’.

Moreover, the results can be compared to previous and upcoming reports like inspectorate inspections.

'You have to see if the results are consistent. However, the results might depend on the composition of the audit team. The accents can be on different categories and it is hard to prove.'

The effect of the composition of the audit team can be minimalized by changing the composition every audit, since more unity in rating and same ideas will be created between the different members of the audit team. Moreover, refresh days should be organized to evaluate the discrepancies between different compositions of the audit team. By discussing about these discrepancies more unity in rating will be created and this will lead to more reliable outcomes. Last, on another level, the trainers have to communicate how to educate the audit team by using experience and feedback of practice. When every audit member receives the same training, the method of assessing will be more equal and therefore the results more reliable.

Lay-out. The lay-out of the audit framework depends on the purpose of that specific method. For example, when the method is used for assessing specific indicators, a rating-scheme should be in the lay-out of the audit framework. The expert stated that in his practice often a rating will be provided in the end of the evaluation. How to formulate these rating depends on the purpose of the audit framework as well.

'In the case of Quo Vadis the purpose is to give an impression of the status of development of the schools. Therefore, not sufficient/good, etc. should be provided as rating, but the school board has chosen to use rating in terms of 'is in it's infancy' till 'the school is an example for other schools'. The legitimate task of the inspectorate is assessing schools, but for Quo Vadis it is not.'

Moreover, the expert stated the importance of the clarity of the lay-out. The main theme, in this case data driven teaching, should be explained by a short definition. Then there should be main categories and sub-categories to score. For the user the meaning of the categories should be clear.

'The trick is to formulate the indicators in a way that only one thing can be meant. For example, the inspectorate is focused on the main lines of education and therefore you know exactly what is meant'.

4.2.2 Exploratory Research

Uitleggen waarom observation In this section results of the exploratory research are shown. Different evaluation methods and observation formats are analysed by focussing on representation of the content and lay-out. The focus of the exploratory research is getting ideas about the structuring of the content and the lay-out and not the content of the documents itself, since this is already studied in the theoretical framework. Therefore, resources with other topics than data driven teaching are consulted.

The concepts structure of content and lay-out are quite broad. This approach is chosen, since after the exploratory research guidelines are stated. When the focus is too specific now, important facets with respect to structuring of content and lay-out might be overlooked. Therefore, the term of searching for documents was broad as well (e.g. ‘evaluation method’ and ‘observation method’).

First, the learning-based evaluation method for ubiquitous learning by Huang, Chiu, Liu and Chen (2011) was analysed. Secondly, a format for the evaluation of ZEBO was used (Schildkamp, 2007). Then, a by Cheung (1998) developed student evaluation instrument for distance teaching was taken into account. Moreover, an evaluation method for supporting elementary science education for English learners was used (Gibbons, 2003). Furthermore, an instructional video evaluation instrument was analysed (Beaudin & Quick, 1996). Last, a teaching observation protocol by Sawada, Piburn, Judson, Turley, Falconer, Benford and Bloom (2002) was used. In Table 12 an overview of the results are provided. In Table 13 these results are transformed to guidelines for designing the audit framework of data-driven teaching.

Structure of content. The content in the method of Huang et al. (2011) was divided in five dimensions to create a structure. Under the dimensions statements were shown. In some of the evaluation methods these statements were short and clear and just one concept was measured. However, in some of the methods the explanation consisted of more than one concept, was vague or was missing. In Figure 5 for example ‘students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence’. This indicator contains more than one concept.

Figure 5. *Example Structure of Content.*

III. Classroom Culture

Communicative Interactions

16. Students were involved in the communication of their ideas to others using a variety of means and media.
17. The teacher’s questions triggered divergent modes of thinking.
18. There was a high proportion of student talk and a significant amount of it occurred between and among students.
19. Student questions and comments often determined the focus and direction of classroom discourse.
20. There was a climate of respect for what others had to say.

Student/Teacher Relationships

21. Active participation of students was encouraged and valued.
22. Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.
23. In general the teacher was patient with students.
24. The teacher acted as a resource person, working to support and enhance student investigations.
25. The metaphor “teacher as listener” was very characteristic of this classroom.

Source: Sawada et al. (2002)

Moreover, in not all methods there was room for answering these statements in the same format. Sometimes clear definitions of the rating were missing. Gibbons (2003) showed a small line to fill in

the observed checkmark. However, the user does not know what the rating should be (e.g. sufficient/insufficient or a mark from 0 to zero) and how to interpret the final mark. Schildkamp (2007) provided a clear choice for the users to answer the statements by using ‘strongly agree, agree, disagree, strongly disagree’ (Figure 6). Beaudin & Quick (1996) just mentioned that 1 was poor and 5 was exceptional. The numbers in between were not mentioned.

Figure 6. *Example User-Convenience*

A CHARACTERISTICS OF ZEBO						
How strongly do you agree with the following statements?						
		strongly agree	agree	disagree	strongly disagree	I don't know
A1	The ZEBO output is relevant	<input type="checkbox"/>				
A2	The ZEBO output is up-to-date	<input type="checkbox"/>				
A3	The ZEBO output is inaccurate	<input type="checkbox"/>				
A4	ZEBO fits with the needs of our school	<input type="checkbox"/>				
A5	It is easy to enter data in ZEBO	<input type="checkbox"/>				
A6	It is difficult to generate the ZEBO output	<input type="checkbox"/>				
A7	It is easy to alter data in ZEBO	<input type="checkbox"/>				
A8	The ZEBO output is not clear	<input type="checkbox"/>				
A9	Working with ZEBO takes a lot of time	<input type="checkbox"/>				

Source: Schildkamp (2007).

Furthermore, in the method of Huang et al. (2011) the aim was to evaluate yourself. For the user is important that the statements are clear and written in a correct form, for example: ‘I can conduct learning on my own’.

Lay-out. In the lay-out of Huang et al. (2011) and Cheung (1998) a column to answer the statements was missing. Moreover, providing an explanation of the concept was necessary according to the expert. In for example Gibbons (2003) this was done by using bold and underlined type (Figure 7). However, the explanation can be clearer. For example: students work together in a group setting to complete a task. Questions raising are: What is the ideal form of working in a group setting and which requirements should it have? Beaudin & Quick (1996) added a part of comments to their method. Users can explain their rate per category.

Figure 7. *Example Lay-Out.*

Student Behaviors

Academic Language Scaffolding

Students identify science vocabulary by participating in an introductory activity.

Collaborative Learning

Students work together in a group setting to complete a task.

GIST (Generating Interaction Between Schemata and Text)

Students silently read a section of the text within a group setting, working collaboratively to generate one sentence that summarizes that section of the text, which they then record on paper.

Source: Gibbons (2003)

Furthermore, in all instruments the questions or statements were numbered, which results in more convenience for the user. Especially for discussing the results afterwards. In Table 12 all results are presented.

Table 12. *Overview Results Exploratory Research and Expert Interview*

<i>Source</i>	<i>Structure of Content</i>	<i>Lay-out</i>
Expert Interview	<ul style="list-style-type: none"> -Using several resources and especially of the Dutch Inspectorate. -Adjust the content several types (prototypes) - The indicators should be interpretable the same for every user -Clear definition of concept(s) 	<ul style="list-style-type: none"> -Using main and subcategories -Provide an rating method
Document Huang et al. (2011)	<ul style="list-style-type: none"> -Clear structure of five domains -Clear indicators with only one concept -Clear writing style in I-form 	<ul style="list-style-type: none"> -No box in the format to write down the rating -The indicators are numbered
Document Schildkamp (2007)	<ul style="list-style-type: none"> -Rating scheme clearly defined - Clear writing style in I-form 	<ul style="list-style-type: none"> -Boxes for providing rating -The indicators are numbered
Document Cheung (1998)	<ul style="list-style-type: none"> -Clear main categories -Indicators are measuring more than one concept 	<ul style="list-style-type: none"> - No box in the format to write down the rating - The indicators are numbered
Document Gibbons (2003)	<ul style="list-style-type: none"> -No definition of the observed checkmark -Clear writing style in ‘The teacher..’-form 	<ul style="list-style-type: none"> - The use of type provides clear structure
Document Beaudin & Quick (1996)	<ul style="list-style-type: none"> -Clear description of the concepts -Rating scheme not clearly defined - Explanation of interpretation final rating 	<ul style="list-style-type: none"> - No use of different types to show contrast between indicators -Room for comments to explain rating - The indicators are numbered
Document Sawada et al. (2002)	<ul style="list-style-type: none"> -More than one concept measured in one indicator -Vague terms are not defined -Clear main categories with subcategories 	<ul style="list-style-type: none"> - The use of type provides clear structure -The indicators are numbered

Based on what was seen in the examples and seemed to be important for the upcoming audit framework, guidelines are formulated. The guidelines for developing the audit framework are provided below (Table 13). For defining these guidelines the theoretical framework and the results of the expert interview and exploratory research were used.

Table 13. *Guidelines Audit Framework*

Structure of Content	
1.1	The audit framework should contain the five quality aspects of the Inspectorate Framework.
1.2	The audit framework should contain the five indicators for Data Driven Teaching
1.3	The audit framework should take promoting factors into account
1.4	The content should be organized in main-and subcategories
1.5	The indicators should refer to just one concept
1.6	The audit framework should be interpretable in the same way for every user
1.7	The formulation of the indicators in the format should be linked to the view of the user
1.8	The main concept should be explained
Lay-out	
2.1	Different types should be used to structure the format
2.2	The framework should provide room for rating
2.3	The indicators should be numbered

4.3 Design of Audit Framework

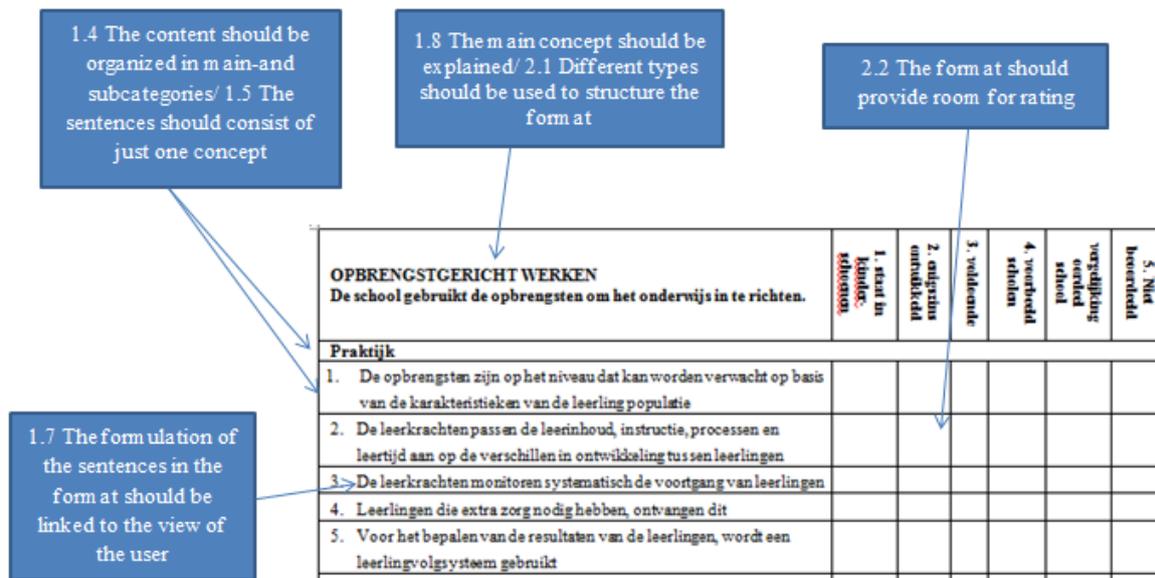
In this section the results are combined to design the first prototype and to make adjustments by using experiences in practice and expert feedback. Finally, the final audit framework was developed.

4.3.1 Prototype 1

By using the guidelines, prototype 1 was developed (appendix 5.1). How guidelines 1.4, 1.5, 1.7, 1.8, 2.1 and 2.2 are processed is shown in Figure 8. The guidelines 1.1, 1.2 and 1.3 can be found in the entire prototype, since these guidelines are the basis of structuring the content. Guideline 1.6 ‘the audit framework should be interpretable the same for every user’, cannot be shown directly. This should be found out in practice. Finally, the last guideline 2.3 ‘the indicators should be numbered’, is shown in the entire prototype.

The main headings ‘Practice’ and ‘Promoting Factors’ for data use were chosen for the first prototype. The criteria under the heading practice are observable in lesson observations and the criteria under promoting factors can be assessed during interviews with the observed teachers and the internal coach. By the use of these two headings, it is more clear that the criteria under practice have to be measured in practice and the promoting factors in interviews during the audits.

Figure 8. *Prototype 1*

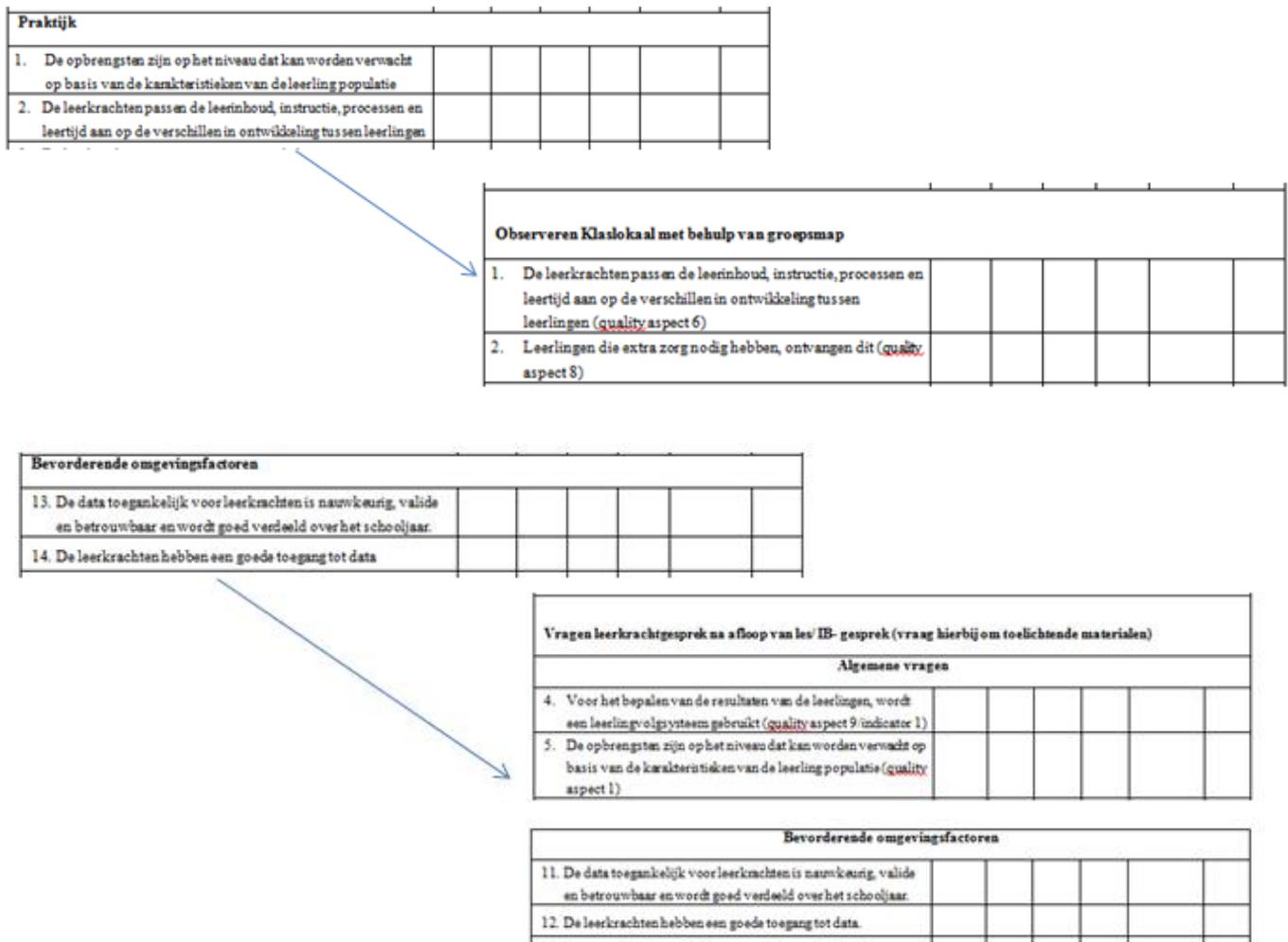


4.3.2 Prototype 2

The first prototype was adjusted after the implementation during the first audit. Feedback from the experiences of the audit team and feedback of the audit coach were used to make adjustments to this first prototype. Four improvements were formulated. First, that the promoting factors are not observable, is not clear. Therefore, the new headings should clarify the way the criteria are assessed. Furthermore, the concepts in the criteria should be more measurable. In the first prototype, the indicators seemed to be too long and unclear. Moreover, the description of data-driven teaching in the first prototype was: ‘the school uses outcomes to organize the education’. This definition should be more specified according to the audit team. Finally, experience showed that a box for comments should be useful when the user prefers to write down where the rating is based on.

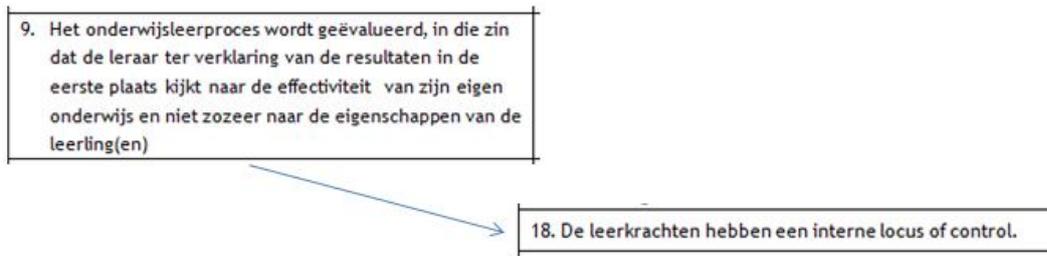
For the first adjustment the term ‘Practice’ was changed in ‘Observation in classroom by use of group folder’ (Figure 9). A group folder consists of information about activities and students in that classroom at that specific day (e.g. group plans, analyses of ParnasSys). Instead of 12 criteria, only 3 were measured under this heading. The other criteria were placed under a new heading. The term ‘Promoting factors’ was changed in a new heading called ‘Questions for interview teacher after observed lesson/ interview internal coach (ask hereby for additional materials)’. This heading was subdivided in ‘general questions’ and ‘promoting factors’.

Figure 9. *Adjustment 1*



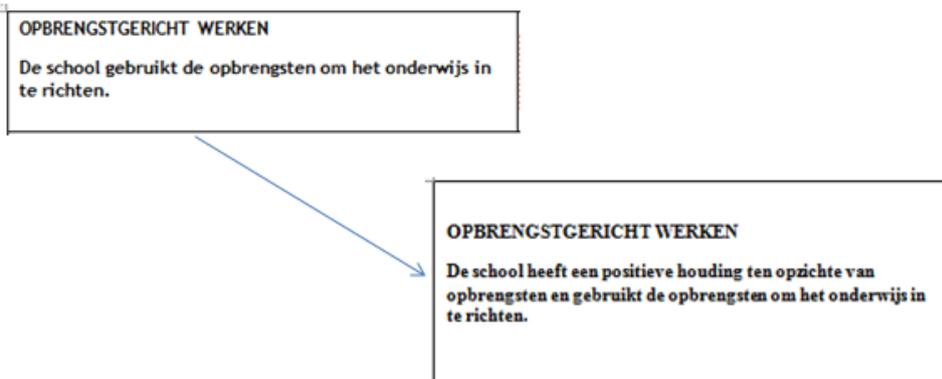
For the second adjustment indicators were shortened and some were skipped, since the indicator was measuring the same as another one. The indicator in Figure 10 was too long and in short was asking about to what extent teachers are using data to reflect on their own teaching activities (internal locus of control). This indicator was already in the audit framework, so the long version was skipped. The members of the audit team know that internal locus of control means that teachers are not just using student outcomes for analysing student performance, but that the results can be used to reflect on the teaching activities of that teacher as well. When ten students make many errors in ‘proportions’, it might be that the teacher paid too little attention to this topic. When teachers realize this, they have an internal locus of control.

Figure 10. *Adjustment 2*



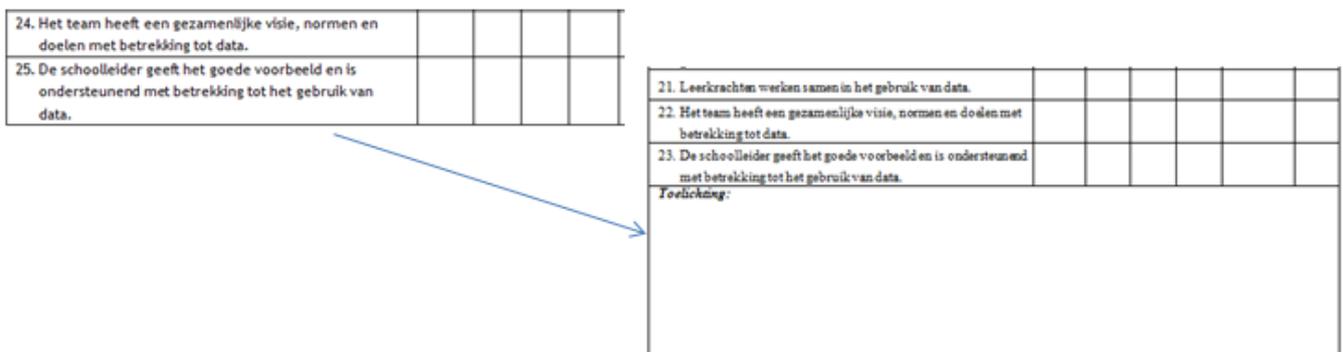
Since the definition of data-driven teaching seemed to miss the attitude of teachers the definition changed from: ‘the school uses outcomes to organize the education’ into ‘the school has a positive attitude towards outcomes and uses the outcomes to organize the education’ (Figure 11)

Figure 11. *Adjustment 3*



The final adjustment was the addition of a box for explanation of the rating, which is preferable when to discuss the scores between the audit team members (Figure 12). The second prototype is shown in Appendix 5.2.

Figure 12. *Adjustment 4*



4.3.3 Final Audit Framework

For adjusting the second prototype the experiences in the second audit were used as well as an interview with an expert, the trainer of the audit systematic. The expert made suggestions for

improving the second prototype. The first advice was to shorten the indicators of promoting factors, since now the framework looks like an interview. These indicators might be represented in an appendix in the form of guidelines for questions that can be asked during the audit. Because of all those indicators that are overlapping, the main category is not clear yet. Secondly, the box with explanation is preferred to be in the end of the framework and not after each topic. Preferably, the appendix should provide a box for explanations. Moreover, the expert stated that data driven teaching is taking place on several levels like mentioned in the theoretical framework. Suggested is to structure the framework into these levels instead of the structure used in the second prototype. In addition, something about development perspectives of children are missing. This is an indicator that should be added.

First, most of the promoting factors were transformed to the appendix of the audit framework, since there were too many indicators in the method itself (Figure 13) As a result, the audit framework felt more like a questionnaire. The indicators that were skipped were replaced by the indicator ‘the attitude of teachers towards data-driven teaching is optimal’ and ‘the knowledge of teachers of data-driven teaching is optimal’. The indicators in the appendix can help to answer these criteria. Secondly, the box of explanation was put in the appendix as well.

Figure 13. *Adjustment 1 and 2*

Bevorderende omgevingsfactoren					
36. De data toegankelijk voor leerkrachten is nauwkeurig, valide en betrouwbaar en wordt goed verdeeld over het schooljaar.					
37. De leerkrachten hebben een goede toegang tot data.					
38. Er zijn voldoende middelen om van data gebruik te kunnen maken.					
39. De leerkrachten hebben een positieve houding ten opzichte van het gebruik van data.					
40. De leerkrachten hebben de kennis en vaardigheden om van data gebruik te maken.					
41. De leerkrachten hebben een interne locus of control (de leerkracht gebruikt resultaten om te kijken naar de effectiviteit van zijn eigen onderwijs)					
42. De leerkrachten zijn gemotiveerd om data te gebruiken.					
43. Er is voldoende tijd voor leerkrachten om data te gebruiken.					
44. Er is een data expert binnen de school.					
45. Er zijn trainingen voor leerkrachten met betrekking tot het gebruik van data.					
46. Leerkrachten werken samen in het gebruik van data.					
47. Het team heeft een gezamenlijke visie, normen en doelen met betrekking tot data.					
48. De schoolleider geeft het goede voorbeeld en is ondersteunend met betrekking tot het gebruik van data.					
<i>Toelichting:</i>					

Bijlage

Voorbeeldvragen voor leerkrachten:

- Vind u dat de data nauwkeurig, valide en betrouwbaar?
- Vind u dat de toegankelijkheid van data goed verdeeld is over het schooljaar?
- Vind u dat u een goede toegang heeft tot data?
- Vind u dat er genoeg middelen zijn om van data gebruik te kunnen maken?
- Hoe is uw houding ten opzichte van het gebruik van data?
- Bent u gemotiveerd om data te gebruiken?
- Vind u dat u genoeg kennis en vaardigheden heeft om gebruik te kunnen maken van data?
- Gebruikt u de resultaten ook om te kijken naar de effectiviteit van uw eigen onderwijs?
- Heeft u voldoende tijd om data te gebruiken?
- Is er een data expert binnen de school waar u naartoe kunt voor vragen over het gebruik van data?
- Zijn er wel eens trainingen met betrekking tot het gebruik van data?
- Werken jullie als leerkrachten onderling samen in het gebruik van data?
- Wat vind u van de rol van de schoolleider in het gebruik van data?

Voorbeeldvragen voor interne begeleiders:

- Hoe vind u de houding van leerkrachten ten opzichte van data?
- Denkt u dat leerkrachten gemotiveerd zijn om data te gebruiken?
- Hoe schat u de kennis en vaardigheden van leerkrachten in om gebruik te maken van data?
- Is er een data-expert binnen de school?
- Zijn er teambreed een gezamenlijke visie, normen en doelen met betrekking tot data?

Toelichting:

Then, the structure of the audit framework was changed. Instead of the structure of way of assessing (by observing or interviewing) as used in the second prototype, the structure in this final audit framework is based on the measuring levels: student-level, group-level and school-level, since this provides a more clear view on which level the school should improve. Finally, one indicator was added on student-level: ‘for students with additional care a development plan and the results are shown’. The final audit framework can be found in Appendix 5.3.

4.4 Conclusion and Discussion

The final audit framework seemed to be useful according to the audit team, the expert and stakeholders in practice the audit was conducted in. However, this does not mean that this final audit framework should not be adjusted in future. Next year, more audits will be conducted within Quo Vadis. Then, the audit team, the expert or the stakeholders in practice might have suggestions for improvements. In future, other audit frameworks should be designed by using resources, expert interviews and an exploratory research. For example for the topic action-oriented working (in Dutch Handelingsgericht Werken) or suitable education (in Dutch Passend Onderwijs). When the school that will be audited has specific aims about the theme the audit team will focus on, the audit team have a matching audit framework for that requested theme. For example, when a school would like to become excellent in providing suitable education, the school can ask the audit team to focus on that topic more specifically. An audit framework should be available to assess that topic then.

In conclusion, the research question of this part of the study was how to assess the implementation of data driven teaching effectively during the audits. This design study showed the deliberate process of developing an final audit framework to assess data driven teaching. After the adjustments to the first and second prototype the final evaluation seemed to be effective in practice.

5. Advice

In this part of the study the final research question is explained. The school board aims to receive an advice on how to improve data driven teaching within the schools. After analysing the knowledge and skills of teachers to perform the analyses in ParnasSys, stating the vision and experience of teachers in relation to data driven teaching and the design of an instrument measuring the implementation of data driven teaching in daily practice, improvements for the school board Quo Vadis will be suggested.

Research Question 4: *How can the use of data driven teaching within the schools of Quo Vadis be improved?*

This part of the research has a descriptive study design. Data from the first and second part of the study are used to formulate an advice for Quo Vadis. The advice for Quo Vadis is structured in Table 14. First, in this table the concept the advice is related to is shown. The concepts the advice can be related to are step 1: evaluating and analysing results, step 2: setting SMART and challenging goals, step 3: determining strategy for goal accomplishment, step 4: executing strategy for goal accomplishment, FOCUS-project and finally about the audit framework. Moreover, the responsible person(s) for implementing the advice are mentioned. Expected is that when somebody is appointed to be responsible, the advice might be applied more effectively. The responsible persons are: the principal of the school, the school board Quo Vadis, ParnasSys, the teachers of the schools and the audit team. Furthermore, the topic is mentioned to specify in a few words the content of the advice. Finally, the actual advice is explained in key words. ‘

Advice Step 1: Evaluating and analysing results. The first advice is intended for the system ParnasSys. Many schools of Quo Vadis are using Snappet. However, these results cannot be transferred to ParnasSys. Now, teachers have to type the scores manually from Snappet to ParnasSys. An advice for ParnasSys is to collaborate with the developers of Snappet and to connect both systems. This might be a reason for more schools to start using Snappet in future. Moreover, teachers mentioned that updates in ParnasSys are not always well communicated. ParnasSys shows in the system when an update has taken place. However, most teachers are not checking these updates for themselves, but wait till they hear that the update is relevant for them. Therefore, the advice for the principal of the school is to assign an employee to stay informed about updates in ParnasSys and to inform teachers in the team about these relevant updates. This person might be the internal coach, who was mostly mentioned as the data expert in the schools. The final advice with regard to step 1 can be assigned to ParnasSys as well. Teachers mentioned there are many buttons in the system, which are not relevant for them. Since ParnasSys is used nationally, the system is not designed specifically for a group of schools in the same context. The advice is to provide freedom to schools to remove buttons which are not relevant and only open buttons that are actually used in that school.

Advice Step 2: Setting SMART and challenging goals. The Education Inspectorate (2010) claimed that student outcomes will become valuable when results are compared to the goals set by the school. However, often those ambitions are not stated according to the Education Inspectorate (2010). This was mentioned in the interviews as well. There are some goals in terms of performance growth, but those goals are not set SMART and for the long term. The advice is to set SMART goals to make improvements in student outcomes higher. According to Doolaard et al. (2001) quality improvement is about actions resulting from the observed discrepancy between goals and reality in order to decrease the discrepancy. During the audit, the current situation of schools is determined. The advice of the audit team will focus on how to improve the quality to reach the target situation. In terms of student

outcomes this target situation should be clear by setting SMART goals for now and for future. It could be that those goals are set and teachers do not know about these goals. In that case, the advice will be to inform teachers about the goals set by the school.

Advice Step 3: Determining strategy for goal accomplishment. The first advice with regard this step is to make changes to the group plans. The aspect time was often mentioned in combination with the group plans. Teachers claimed that writing group plans take too much time in comparison to the actual use in practice. Therefore, the advice is to make a format, together with the team, with only relevant aspects for writing in a group plan. The principal of the school can lead this process by starting a discussion about what is relevant and why. The final choice should be a compromise between the members of the school team and finally a well-defined choice, so that every team member knows what is agreed. When teachers are actually involved in this process, the group plan will have more meaning to them and will be applied better in practice. In short, shared decision-making is important (Desimone, 2002). This process should be effectively and quickly performed, since teachers claimed in the interviews that there is not much time for extra activities.

The second advice with regard to group plans is to set goals for which subjects should be presented in group plans (e.g. mathematics and spelling, or mathematics, reading and spelling), since results showed large differences in use of group plans between schools. Due to the fact that the aim of data driven teaching is to provide additional care to specific students (Visscher et al., 2010), some subjects should be mandatory to present in a group plan to increase additional care to students and therefore the school outcomes. The responsible person for this is the school board of Quo Vadis, since the school board is making decisions for all schools. However, the opinion of principals of the schools should be taken into account, due to the fact that, as mentioned above, shared decision-making is important (Desimone, 2002). When the school board is imposing specific activities without asking principals, the requirements of the school board might not be implemented by the principals in the schools.

Advice Step 4: Executing strategy for goal accomplishment. The interviews revealed that the experts of Quo Vadis can be used more effectively in future. Now, the experts are only working in one of the schools. Not all schools have an expert in each subject, so schools can learn from experts of other schools. Examples of topics teachers are expert in are mathematics, language or behaviour.

Advice FOCUS-project. Teachers mentioned aspects of the FOCUS-project that might be improved. Research question 1 indicated that five years after the schools had participated in the project, teacher knowledge was even at a higher level, but several improvements for the training were suggested. The mainly mentioned improvement was about making the material more relevant for daily practice. Now, some materials were shown without connection to practice and therefore never applied afterwards.

Another aspect is the focus of the training. Now, the training was too broad and not school-centred. In short, teachers prefer trainings that are related to their school context and that can be applied immediately. In practice this means that the training is not with too many people together, like the FOCUS-project, but for only one or two school teams. The context of both schools should be comparable, so that what is introduced in the training is applicable to both schools. Furthermore, the theory presented in the training should be directly linked to practical exercises. The advice for Quo Vadis is to take these aspects into account by implementing a course in future. Moreover, it is important that the level of the training is in line with the level of knowledge of the teachers. Teachers who already possess the basic knowledge and would like to gain more insights in data driven teaching a masterclass or advanced course is recommended. For teachers with little knowledge about data driven teaching a training for beginners is recommended. The knowledge of teachers can be tested by the questionnaire of this study. Guidelines should be set about when the teacher possesses sufficient knowledge to attend to a masterclass or advanced course or when a training for beginners should be attended.

Moreover, interviews showed that younger teachers have a more positive attitude towards data driven teaching. This confirmed the statement of Berends et al. (2002) that teachers older than 40 years significantly differ in their cooperation in innovation. Younger teachers have a more positive attitude towards innovations, like in this study a more positive attitude towards the use of ParnasSys. Moreover, older teachers think data driven teaching is difficult. Therefore, the data expert is advised to support teachers in data driven teaching and having a positive attitude. The data expert, mostly the internal coach, is most frequently in contact with teachers about this topic and therefore probably the best responsible person to implement this advice.

Furthermore, an advice in relation to the knowledge and skills of teachers is to evaluate whether there is need for a refresh course in the schools of Quo Vadis, as some of the interviewed teachers mentioned to prefer such course. By organizing such a course, the eighth advice should be taken into account (relevance and school-centred).

Finally, ParnasSys is organizing trainings when a major update has taken place. However, none of the teachers stated to attend these trainings. One of the advices is to attend these trainings with the school team to stay up to date with the system. Trainings seemed to be more effective when followed by the entire team together instead of one or two participants of the team (Bodilly, 1998).

In conclusion to the steps of data driven teaching, the main thing which seemed to be difficult is using results for evaluating the group plan. Moreover, the step of executing the strategy for goal accomplishment is often not actually performed in practice. Therefore is advised to simplify the plans. When the group plans are less extensive, for teachers it might become more clear what should be in which box and at one glance it can be applied in practice.

Advice Audit Framework

Finally, with respect to the second part of the study two advices are stated. First can be advised to use the audit framework in the upcoming audits to assess the implementation of data driven teaching, since the audit team and the schools of Quo Vadis seems to been satisfied with the designed audit framework.

With respect to the use of the audit framework it can be advised that the principals should take the self-evaluation seriously. As mentioned before, De Boer et al. (2013) have investigated if audits lead to demonstrable and sustainable forms of school improvement. Respondents indicated that the combination of self-evaluation and the audit provides added value to their education. In schools that opted for audits without self-evaluation, the effects were less visible.

Table 14. *Overview Advices*

<i>Nr.</i>	<i>Concept</i>	<i>Responsibility</i>	<i>Topic</i>	<i>Advice</i>
1	Step 1: evaluating and analysing results.	ParnasSys	Snappet	Since several schools are working with Snappet, these results should be connected to ParnasSys.
2	Step 1: evaluating and analysing results.	Principal School	ParnasSys	Assign employee, for example internal coach, to stay informed about updates in ParnasSys and inform teachers in their team.
3	Step 1: evaluating and analysing results.	ParnasSys	Access	Making the system more school-related by removing buttons that are not relevant for them.
4	Step 2: setting SMART and challenging goals	Principal School	Setting goals	Setting SMART and long-term goals with regard to student outcomes.
5	Step 3: determining strategy	Principal School	Group plans	Making a format, together with the team, with relevant aspects that should be in the group plan.
6	Step 3: determining strategy	Schoolboard Quo Vadis	Group plans	Setting goals for which subjects should be presented in group plans.
7	Step 4: executing strategy	Principal School	Experts	Using the knowledge of experts in other schools.
8	FOCUS-project	School board Quo Vadis	Trainings	Taking the relevance and situation into account when choosing trainings in future.
9	FOCUS-project	Internal Coach	Attitude	Supporting teachers in data driven teaching and having a positive attitude.
10	FOCUS-project	School board Quo Vadis	Training	Evaluating the need for a refresh course in all schools of Quo Vadis.
11	FOCUS-project	Teachers	Training	Attending to trainings of ParnasSys.
12	Audit Framework	Audit team	Data Driven Teaching	Using the audit framework to assess the implementation of data driven teaching in the schools.
13	Audit Framework	Principal School	Self-evaluation	Using the self-evaluation before the audit team will audit the school.

An additional advice, not for Quo Vadis but for the Teacher Training College, is to focus more on the use of data, as starting teachers mention that they lack knowledge and skills about this topic. Beside these advices, teachers of Quo Vadis showed to perform aspects of data driven teaching in a way that it could be an example for other schools. First, some schools already make use of the online workspace Snappet. Teachers explained that data driven teaching is more easy and student-centred by

using this method. Moreover, many school teams are powerful in designing new methods to improve data driven teaching, when the old method is not working. Almost all group plans of the FOCUS-project are transformed in group plans fitting the context of the school. Moreover, the Education Inspectorate (2010) claimed that on group-level the step of analysing results is often not performed. This results in ineffective adaptive teaching in the classroom. However, teachers of Quo Vadis showed to analyse the student results sufficiently by conducting for example error analyses. Furthermore, the choices about arranging groups for instruction are well thought about within Quo Vadis. All teachers are using I to V-scores or A to E-scores in addition to error analyses to arrange groups for their instruction. Moreover, the Education Inspectorate (2010) claimed that analyses on learning gains of students are little performed by teachers in general. Teachers of Quo Vadis are performing these analyses successfully according to both the questionnaire, where was highly scored on performance growth, as the conducted interviews. Finally, many school boards seemed to be unaware of the outcomes of the schools (Education Inspectorate, 2010). In contrast to those results, the school board Quo Vadis showed to have adequate information about the outcomes of the schools.

6. General Conclusion and Discussion

In this section the conducted research is discussed per part of the study. First, in the evaluation, the theoretical and practical implications are mentioned, the suggestions for future research are provided and limitations are outlined. Finally, overall conclusions are linked to recommendations for practice.

6.1 Part I: Evaluation of Ability, Vision and Experiences of Teachers

Evaluation. This research confirmed the study about the effects of the FOCUS-project (Staman et al., 2014) with regard to the knowledge of data driven teaching. Results showed that the teachers even interpret the analyses in ParnasSys better than in the post-test of the FOCUS-project and that even teachers who did not participate in the project scored higher than the post-test. Therefore, the effect of the FOCUS-project can be seen as a long term effect. Desimone (2002) already mentioned that the implementation of an improvement can take years and therefore, the results are not directly measurable. This is confirmed by this study, since teachers are scoring higher now than the post-test of the FOCUS-project. For practice this implies that the FOCUS-project part I seemed to be effective and that the investment in this project was useful. However, other training or information than the FOCUS-project might be gathered by the schools, so this effect cannot with certainty be attributed to the FOCUS-project. Moreover, since the amount of respondents was quite low, this results might not be generalizable for all teachers ever participated in the FOCUS-project. It might be that only teachers who feel able to interpret the analyses filled in the questionnaire. To make a reliable conclusion, additional research should be conducted by questioning all participants of the FOCUS-project. Now, from some of the schools none of the teachers responded and from other schools many teachers. On

the one hand, since from one school many teachers participated means that both teachers with a high and low ability participated in the questionnaire. On the other hand, since of some of the schools no teachers responded, might have led to a less reliable representation of schools of Quo Vadis. Moreover, it was unknown if teachers followed other courses about data driven teaching after the FOCUS-project. To know for sure the FOCUS-project is effective, a randomized experiment should be conducted. Finally, in future research the student outcomes of the schools participating in the FOCUS-project could be compared to the student outcomes in 2010 to see if the outcomes already have been improved. Then, the effectiveness of data driven teaching can be assessed. This might be difficult, since the population of students, teachers and other factors might have influenced the student outcomes.

With respect to the interviews it can be concluded that the results of the study of Staman et al. (2014) are not in line with the research conducted in this study. Staman et al. (2014) claimed that in both pre-test and post-test high attitudes towards data driven teaching were measured. During the interviews mainly older teachers did not show a positive attitude towards data driven teaching. In future research this might be investigated by interviewing more teachers or by conducting an questionnaire which measures attitude. Furthermore, more evidence to check if the statements of the teachers are true should be asked in future. Teachers might state to perform the group plans in practice, but when these plans and evaluations are really shown during the interview, these statements become more reliable. Moreover, Faber et al. (2013) mentioned that through data driven teaching teachers become more aware of the learning progress of students. All teachers interviewed are using data about performance growth of students and are therefore focussed on the learning progress of students. If this is a result of the FOCUS-project cannot be concluded, since it is unknown if this analysis was already used by teachers before participating in the project. Practical implications are that when a school would like to implement a course like the FOCUS-project, they should take the relevance of the material into account as well as a focus on the school. All teachers that were interviewed and participated in the FOCUS-project argued that the project was too broad. Furthermore, since Snappet seemed to support the steps of data driven teaching, in future, research should be conducted about the effects of Snappet and possible updates for this system to optimize data driven teaching.

Conclusions and Recommendations. In short, what can be concluded from the first part of the study is that the extent to what teachers are able to use ParnasSys for implementing data driven teaching is higher than after the FOCUS-project. The results significantly differed. However, younger teachers claimed to know too little about data driven teaching. Recommended is to offer a course for those starting teachers and eventually other teachers interested. With respect to the vision on and experiences with data driven teaching of teachers of Quo Vadis it can be concluded that not all analyses learnt in the FOCUS-project are applied in daily practice. Now, teachers choose for themselves what is relevant and time worthy. It is recommended to make schoolwide agreements

about which analyses to use. When teachers shift between grades in a new school year (e.g. instead of teaching pre-schoolers, that teacher should teach grade 6) same analyses should be carried out in that grade.

6.2 Part II: Development of an Audit Framework

Evaluation. In part two an audit framework to assess data driven teaching was designed. The theoretical implication of the effectiveness of such an audit framework is that the guidelines of the inspectorate are proven to be applicable to the daily practice of data driven teaching within the context of this study. In future research the audit framework might be applied in another school board to check if the method is useful for them as well. Now only three audits were performed in the same school board. The reliability of the audit framework will increase when more schools are assessed. A practical implication is that not only the knowledge of the teachers can be assessed, but the actual appliance of data driven teaching in daily practice as well. The knowledge of the teachers might be up to date, but when this is not applied in practice, the effect of data driven teaching is negligible. A suggestion for future research is to check how schools are handling the findings and recommendations of the audit report, since the PO-Raad & Education Inspectorate (2015) showed that the effectiveness of the evaluation of the audit team depends on how the school handles the findings and recommendations in the audit report. One of the limitations of the design of the audit framework is that only a selection of six existing methods were analysed. When other methods were analysed, the guidelines could be different. Moreover, the audit framework was tested within one audit team. The question is if other stakeholders can apply this audit framework in practice as well.

Conclusions and Recommendations. What can be concluded is that an audit framework is designed which seemed to be effective in assessing data driven teaching within Quo Vadis. It is recommended to use this audit framework as a starting point when to apply it in other organizations. Adjustments with respect to the content might be necessary to make the evaluation effective for other organizations as well. Teachers of Quo Vadis participated in the FOCUS-project, but teachers of others school boards might have participated in another project with the goal to learn to apply data driven teaching. Those other school boards might believe other concepts should be in the audit framework as well. Finally, with respect to the implementation of the advice resulting from the audit it is important to take attitude towards evaluating, capacity of school inventiveness and the extent the requests of the teachers are addressed into account (Schildkamp et al., 2009a).

6.3 Advice

Evaluation. In this part of the research the outcomes of the first and second part were summarized and formulated as advices for the daily practice of schools of Quo Vadis. Therefore it can be concluded

that all the individual advices are implications for practice. In future research, more of these advices can be formulated by interviewing for example internal coaches and principals as well. Now only teachers were taken into account. The theoretical implication of this part of the study is that the effectiveness of the FOCUS-project only was determined in taking the knowledge of teachers into account. Now, the actual implementation of data driven teaching as well as the vision and experience of teachers were measured. This qualitative study confirms the effectiveness of some parts of the FOCUS-project, but the actually appliance of what is learnt in the project is remaining behind. In terms of application of data driven teaching, the FOCUS-project is less successful than quantitative tests showed.

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Appendices

Appendix 1 Survey



Vraag 1: Wat is uw naam?

Vraag 2: Op welke school binnen Quo Vadis werkt u? Werkt u op meerdere scholen, geef dan aan waar u de meeste uren werkt.

Vraag 3: Wat is uw leeftijd?

- <18
- 18-29
- 30-44
- 45-59
- 60+

Vraag 4: Aan welke groep geeft u (voornamelijk) les?

- Groep 1/2
- Groep 3/4
- Groep 5/6
- Groep 7/8



Vraag 5: Werkt u langer dan één schooljaar binnen Quo Vadis?

- Ja
- Nee

Vraag 6: Heeft u deelgenomen aan het FOCUS-project (=project rond 2011, waar opbrengstgericht werken met behulp van ParnasSys is behandeld)?

- Ja
- Nee

Nu volgen enkele vragen met betrekking tot het analyseren van opbrengsten.

Vraag 7: Margot is van LVS-niveau B naar niveau C gegaan met rekenen. Hoe scoort zij nu in vergelijking met het landelijk gemiddelde?

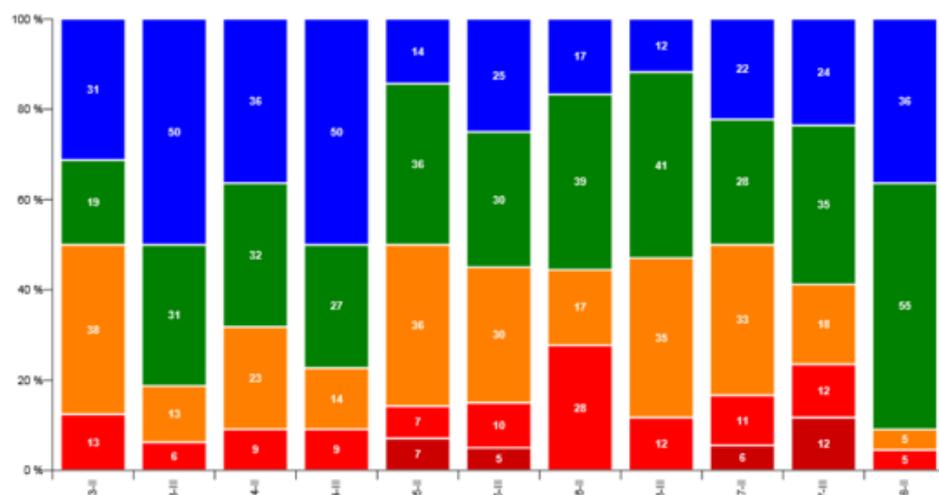
- Boven het landelijk gemiddelde
- Gelijk aan het landelijk gemiddelde
- Onder het landelijk gemiddelde
- Weet ik niet

Vraag 8: Mark scoorde op de vorige LVS toets op IV-niveau en scoort nu weer op IV-niveau. Welke van de onderstaande beweringen is onjuist?

- Mark scoort op hetzelfde niveau, maar is mogelijk wel gegroeid qua vaardigheid
- Mark scoort op hetzelfde niveau, maar mogelijk is zijn vaardighedsniveau achteruit gegaan
- Mark scoort op hetzelfde niveau en zijn vaardighedsniveau is dus ook gelijk gebleven
- Weet ik niet

Vraag 9: Gebruik voor deze vraag onderstaande afbeelding. Hoe scoorde groep 4 tijdens de Medio-afname op rekenen-wiskunde vergeleken met het landelijk gemiddelde?

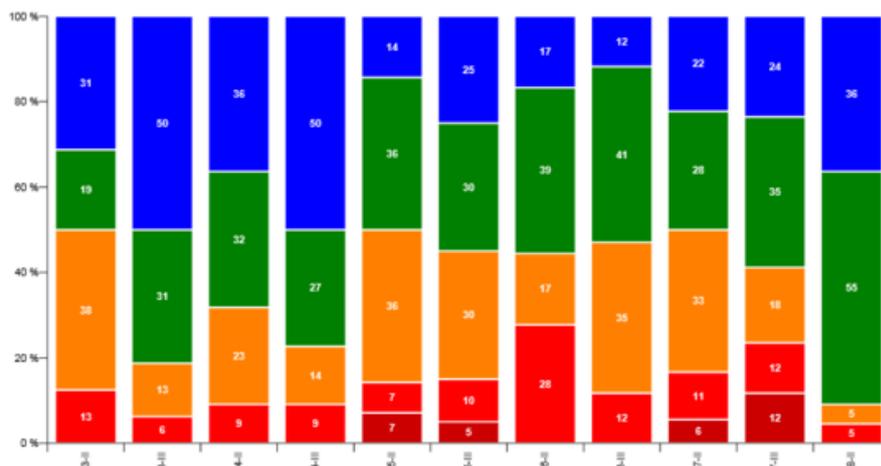
Ontwikkeling niveaupercentages A, B, C en D/E per leerjaar en trimester



- Boven het landelijk gemiddelde
- Gelijk aan het landelijk gemiddelde
- Onder het landelijk gemiddelde
- Weet ik niet

Vraag 10: Gebruik voor deze vraag onderstaande afbeelding. De niveaupercentage van groep 6 op de Medio-afname komt overeen met de landelijke gemiddelde niveaupercentage.

Ontwikkeling niveaupercentages A, B, C en D/E per leerjaar en trimester



- Juist
- Onjuist
- Weet ik niet

Vraag 11: Gebruik voor deze vraag onderstaande afbeelding. Wat laten de resultaten van groep 5 Medio 2011-2012 zien?

Schooljaar		3					4					5					
		Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	
2008 / 2009	II	32,4	L:26	A-	36/36	14	48,5	L:47	B-	33/27	15	59,5	L:70	E+	16/5	19	
				4,2	7/21/0	17			1,36	3,3	20/7/13	16			1,60	1,0	26/16/37
2008 / 2009	III	39,1	L:35	A-	43/29	14	60,5	L:58	B+	33/33	15	64,6	L:75	D-	16/21	19	
				4,0	14/0/14	17			1,45	3,9	13/13/7	16			1,66	1,2	16/5/42
2009 / 2010	II	32,5	L:26	A-	36/29	14	48,8	L:47	B	27/40	15	71,8	L:70	B	36/36	14	
				4,2	14/14/7	15			1,36	3,3	13/13/7	15			1,60	3,5	7/14/7
2009 / 2010	III	42,7	L:35	A-	43/36	14	59,2	L:58	B	47/13	15	80,4	L:75	A-	36/36	14	
				4,1	0/14/7	15			1,45	3,5	27/7/7	15			1,66	4,1	29/0/0
2010 / 2011	II	36,8	L:26	A	53/16	19	49,9	L:47	B	18/45	11	68,1	L:70	C	14/36	14	
				4,5	26/5/0	20			1,38	3,6	18/18/0	13			1,65	2,6	36/7/7
2010 / 2011	III	50,2	L:35	A	63/32	19	63,1	L:58	A-	42/17	12	75,3	L:75	B-	19/31	16	
				4,4	5/0/0	20			1,47	4,1	33/9/0	13			1,65	3,2	38/13/0
2011 / 2012	II	35,7	L:26	A	31/19	16	52,9	L:47	A-	36/32	22	69,2	L:70	C+	17/39	18	
				4,4	38/13/0	18			1,45	4,0	23/9/0	22			1,65	2,9	17/28/0
2011 / 2012	III	48,7	L:35	A	50/31	16	64,0	L:58	A-	50/27	22	75,7	L:75	B-	25/30	20	
				4,4	13/6/0	18			1,56	4,1	14/9/0	22			1,73	3,3	30/10/5

- De groep presteert beter dan vorig jaar
- De groep presteert beter dan de vorige groep 5
- De groep presteert boven het landelijk gemiddelde
- Weet ik niet

Vraag 12: Gebruik voor deze vraag onderstaande afbeelding. Hoe scoort groep 5 aan het eind van het schooljaar 2010-2011?

Schooljaar	3					4					5					
	Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	
2008 / 2009	32,4	L:26	A-	36/36	14	48,5	L:47	B-	33/27	15	59,5	L:70	E+	16/5	19	
			4,2	7/21/0	17			1:36	3,3	20/7/13	16			1:60	1,0	26/16/37
2008 / 2009	39,1	L:35	A-	43/29	14	60,5	L:58	B+	33/33	15	64,6	L:75	D-	16/21	19	
			4,0	14/0/14	17			1:45	3,9	13/13/7	16			1:66	1,2	16/5/42
2009 / 2010	32,5	L:26	A-	36/29	14	48,8	L:47	B	27/40	15	71,8	L:70	B	36/36	14	
			4,2	14/14/7	15			1:36	3,3	13/13/7	15			1:60	3,5	7/14/7
2009 / 2010	42,7	L:35	A-	43/36	14	59,2	L:58	B	47/13	15	80,4	L:75	A-	36/36	14	
			4,1	0/14/7	15			1:45	3,5	27/7/7	15			1:66	4,1	29/0/0
2010 / 2011	36,8	L:26	A	53/16	19	49,9	L:47	B	18/45	11	68,1	L:70	C	14/36	14	
			4,5	26/5/0	20			1:38	3,6	18/18/0	13			1:65	2,6	36/7/7
2010 / 2011	50,2	L:35	A	63/32	19	63,1	L:58	A-	42/17	12	75,3	L:75	B-	19/31	16	
			4,4	5/0/0	20			1:47	4,1	33/8/0	13			1:65	3,2	38/13/0
2011 / 2012	35,7	L:26	A	31/19	16	52,9	L:47	A-	36/32	22	69,2	L:70	C+	17/39	18	
			4,4	38/13/0	18			1:45	4,0	23/9/0	22			1:65	2,9	17/28/0
2011 / 2012	48,7	L:35	A	50/31	16	64,0	L:58	A-	50/27	22	75,7	L:75	B-	25/30	20	
			4,4	13/6/0	18			1:56	4,1	14/9/0	22			1:73	3,3	30/10/5

- Boven het landelijk gemiddelde
- Gelijk aan het landelijk gemiddelde
- Onder het landelijk gemiddelde
- Weet ik niet

Vraag 13: Gebruik voor deze vraag onderstaande afbeelding. Hieronder staan twee beweringen. Welke hiervan is/zijn juist?

1. De leerlingen die in schooljaar 2009-2010 in groep 5 zaten presteerden het best van alle groepen 5 in de periode 2008-2012.
2. De ontwikkeling van jaargroep 5 laat de ontwikkeling zien van de leerlingen die in schooljaar 2011-2012 in groep 5 zitten.

Schooljaar	3					4					5					
	Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	Gem.	L/I	Niv.	%	n=	
2008 / 2009	32,4	L:26	A-	36/36	14	48,5	L:47	B-	33/27	15	59,5	L:70	E+	16/5	19	
			4,2	7/21/0	17			1:36	3,3	20/7/13	16			1:60	1,0	26/16/37
2008 / 2009	39,1	L:35	A-	43/29	14	60,5	L:58	B+	33/33	15	64,6	L:75	D-	16/21	19	
			4,0	14/0/14	17			1:45	3,9	13/13/7	16			1:66	1,2	16/5/42
2009 / 2010	32,5	L:26	A-	36/29	14	48,8	L:47	B	27/40	15	71,8	L:70	B	36/36	14	
			4,2	14/14/7	15			1:36	3,3	13/13/7	15			1:60	3,5	7/14/7
2009 / 2010	42,7	L:35	A-	43/36	14	59,2	L:58	B	47/13	15	80,4	L:75	A-	36/36	14	
			4,1	0/14/7	15			1:45	3,5	27/7/7	15			1:66	4,1	29/0/0
2010 / 2011	36,8	L:26	A	53/16	19	49,9	L:47	B	18/45	11	68,1	L:70	C	14/36	14	
			4,5	26/5/0	20			1:38	3,6	18/18/0	13			1:65	2,6	36/7/7
2010 / 2011	50,2	L:35	A	63/32	19	63,1	L:58	A-	42/17	12	75,3	L:75	B-	19/31	16	
			4,4	5/0/0	20			1:47	4,1	33/8/0	13			1:65	3,2	38/13/0
2011 / 2012	35,7	L:26	A	31/19	16	52,9	L:47	A-	36/32	22	69,2	L:70	C+	17/39	18	
			4,4	38/13/0	18			1:45	4,0	23/9/0	22			1:65	2,9	17/28/0
2011 / 2012	48,7	L:35	A	50/31	16	64,0	L:58	A-	50/27	22	75,7	L:75	B-	25/30	20	
			4,4	13/6/0	18			1:56	4,1	14/9/0	22			1:73	3,3	30/10/5

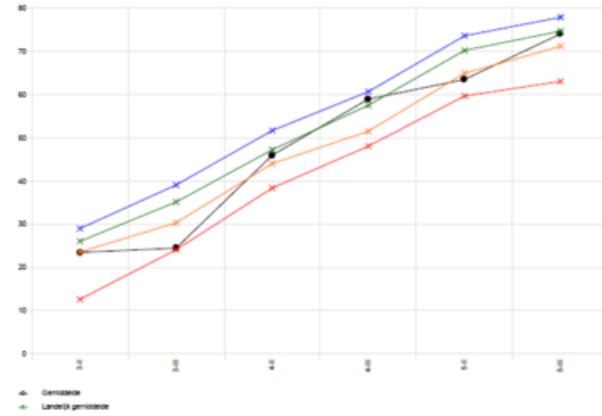
- Bewering 1 is juist, bewering 2 is onjuist
- Bewering 2 is juist, bewering 1 is onjuist
- Zowel bewering 1 als 2 is onjuist
- Zowel bewering 1 als 2 is juist
- Weet ik niet

Vraag 14: Gebruik voor deze vraag onderstaande afbeelding. Hoe scoorde de huidige groep 6 eind schooljaar 2011-2012?

6 (leerjaar 6) 4. Rekenen en wiskunde: CITO Rekenen-Wiskunde LOVS-Totaal

Hoofdst. in 2009 / 2010 - 2011 / 2012

Gemiddelde schaaScore t.o.v. ABCDE-normgrenzen



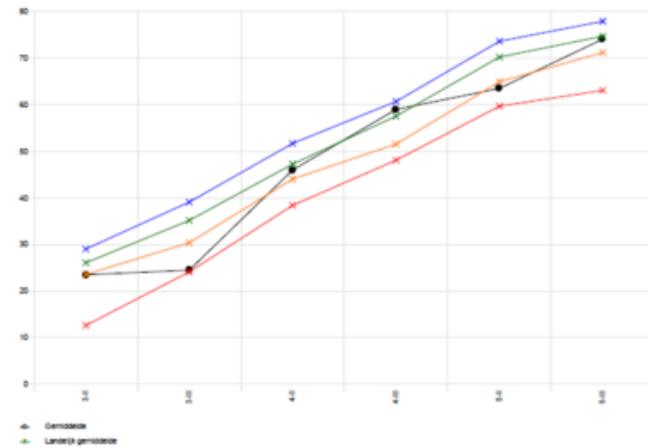
- Boven het landelijk gemiddelde
- Gelijk aan het landelijk gemiddelde
- Onder het landelijk gemiddelde

Vraag 15: Gebruik voor deze vraag onderstaande afbeelding. Wat kunt u zeggen over de rekenprestaties van deze groep op de E4-toets in vergelijking tot de M4-toets?

6 (leerjaar 6) 4. Rekenen en wiskunde: CITO Rekenen-Wiskunde LOVS-Totaal

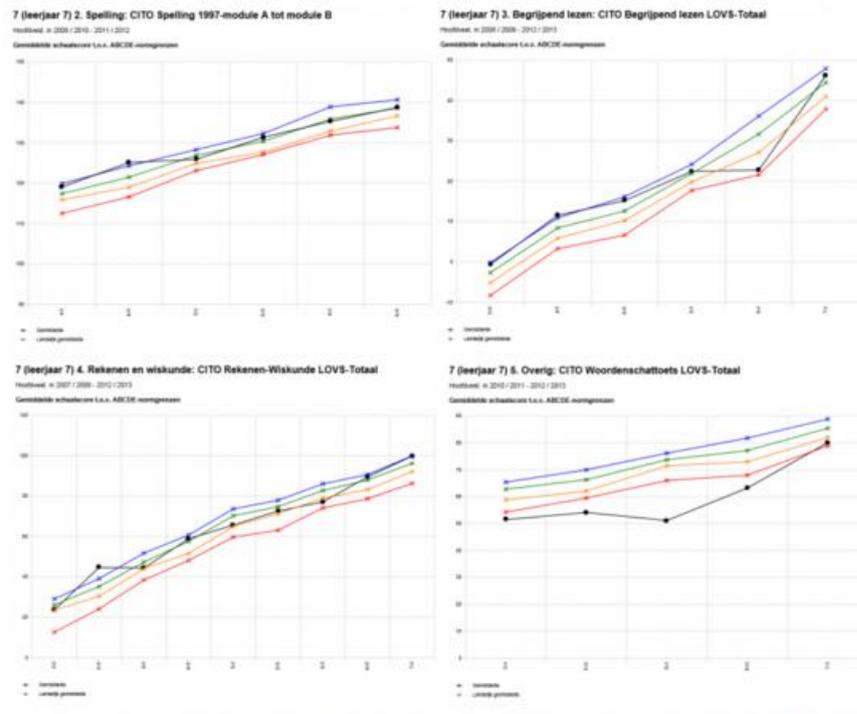
Hoofdst. in 2009 / 2010 - 2011 / 2012

Gemiddelde schaaScore t.o.v. ABCDE-normgrenzen



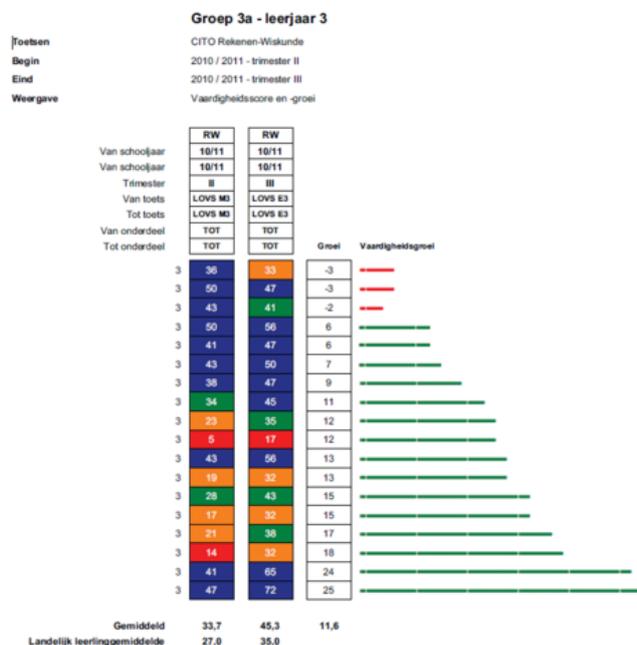
- Die prestaties ontwikkelen zich beneden verwachting
- Die prestaties ontwikkelen zich volgens verwachting
- Die prestaties ontwikkelen zich boven verwachting
- Weet ik niet

Vraag 16: Gebruik voor deze vraag onderstaande afbeelding. Wat kunt u zeggen over de ontwikkeling van de rekenprestaties en de prestaties op spelling van deze groep tussen ES en M6?



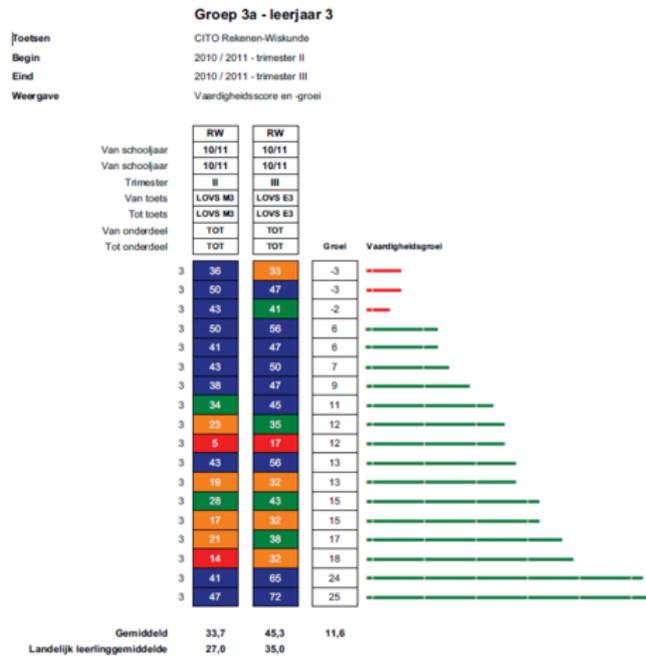
- De rekenprestaties gaan van boven, naar onder het landelijk gemiddelde, en de prestaties op spelling gaan ook van boven naar onder het landelijk gemiddelde.
- De rekenprestaties gaan van boven, naar onder het landelijk gemiddelde, en de prestaties op spelling gaan van onder naar boven het landelijk gemiddelde.
- De prestaties op spelling gaan van onder, naar boven het landelijk gemiddelde terwijl de rekenprestaties onder het landelijk gemiddelde blijven.
- De rekenprestaties gaan van boven, naar onder het landelijk gemiddelde, terwijl de prestaties op spelling boven het landelijk gemiddelde blijven.
- Weet ik niet

Vraag 17: Gebruik voor deze vraag onderstaande afbeelding. "Je kunt met behulp van de kolom 'Groeï' in de afbeelding zien welke leerlingen de hoogste score hebben op de toets."



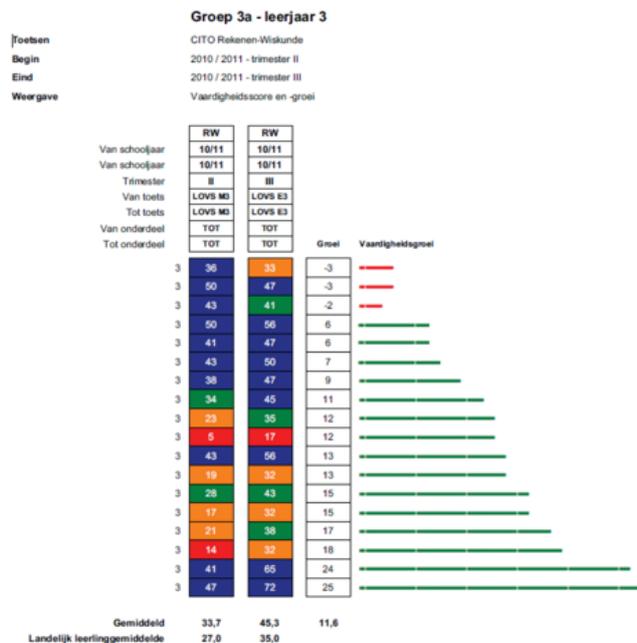
- Juist
- Onjuist
- Weet ik niet

Vraag 18: Gebruik voor deze vraag onderstaande afbeelding. Wat kunt u met zekerheid zeggen over de 2 onderste staafjes in de grafiek?



- Deze leerlingen scoren op B-niveau.
- Deze leerlingen hebben een groei doorgemaakt die ruim boven de gemiddelde groei van hun groep ligt.
- Van deze leerlingen wordt verwacht dat ze in de periode E3 – M4 een vaardigheidsgroei van meer dan 20 doormaken.
- Weet ik niet

Vraag 19: Gebruik voor deze vraag onderstaande afbeelding. Wat kunt u met zekerheid zeggen over het bovenste staafje?



- Deze leerling scoort lager dan D-niveau.
- Bij deze leerling is sprake van een vaardigheidstafame.
- Deze leerling heeft als enige een andere toets gemaakt.
- Weet ik niet

Appendix 2 Coding Scheme Interviews

<i>Concept</i>	<i>Code</i>
Data Characteristics Time	DC TI
Data Characteristics Accuracy	DC AY
Data Characteristics Validity	DC V
Data Characteristics Relevance	DC RV
Data Characteristics Reliability	DC RB
Data Characteristics Access	DC AS
Data Characteristics Tools	DC TO
User Characteristics Beliefs	UC B
User Characteristics Knowledge and Skills	UC KS
User Characteristics Internal Locus of Control	UC ILC
User Characteristics Motivation	UC M
School Organizational Characteristics Time	SOC TI
School Organizational Characteristics Data Expert	SOC DE
School Organizational Characteristics Training	SOC TR
School Organizational Characteristics Teacher Collaboration	SOC TC
School Organizational Characteristics Vision, Norms and Goals	SOC VNG
School Organizational Characteristics School Leader Support	SOC SLS
Data Analyses	DA
Data Use Purposes	DUP
Steps of Data Driven Teaching	SDDT

Appendix 3 Guidance Interview Teachers

Promoting factors (Figure 2)

Data en data systeemkarakteristieken

- Wat vindt u in het algemeen van ParnasSys?
- Wat vindt u van de tijdstippen waarop u data uit ParnasSys kunt halen?
- Wat vindt u van de nauwkeurigheid van de data uit ParnasSys?
- Geven de gegevens uit ParnasSys weer wat u wilt weten? (validiteit)
- Wat vindt u van de relevantie van de data uit ParnasSys?
- Wat vindt u van de betrouwbaarheid van de data uit ParnasSys?
- Hoe omschrijft u de toegang tot ParnasSys?
- Wat vindt u van de middelen die worden geboden om de data daadwerkelijk te gebruiken?

Gebruiker karakteristieken

- Hoe kijkt u tegen de toegevoegde waarde van ParnasSys aan?
- Vergt het werken met ParnasSys bepaalde vaardigheden? Zo ja, beschikt u hierover?
- Evalueert u ook het eigen handelen met behulp van de opbrengsten? Zo ja, hoe?
- Wat vindt u van het werken met en het gebruik van ParnasSys?

Schoolorganisatie karakteristieken

- Heeft u genoeg tijd om ParnasSys te gebruiken?
- Is een data expert binnen de school waar u bij terecht kunt met vragen over ParnasSys?
- Hebben jullie training gehad in het gebruik van ParnasSys?
- Werken leerkrachten samen in het gebruik van ParnasSys?
- Welke visie heeft de school op het gebruik van ParnasSys?
- Welke normen worden binnen de school gesteld met betrekking tot het gebruik van ParnasSys?
- Welke doelen zijn er gesteld?
- Is de schoolleider ondersteunend in het gebruik van ParnasSys?
- Welke verbeteringen zou u kunnen bedenken voor het systeem ParnasSys?

Data-driven decision making (Figure 2)

Data analyses

- Welke analyses voert u uit in ParnasSys? Waarom?
- Wat doet u vervolgens met deze resultaten? Hoe worden resultaten vertaald naar de praktijk? Vergelijk je ze met doelen of met landelijk gemiddelde of?
- Hanteert u naast ParnasSys ook andere manieren om data te analyseren? Zo ja, welke?

Doel datagebruik

- Met welk doel gebruikt u ParnasSys?
- Waarvoor zou data nog meer gebruikt kunnen worden?

Stappen van data-driven teaching (Figure 1)

- Welke stappen onderneemt u met betrekking tot opbrengstgericht werken?
- Hoe evalueert en analyseert u de resultaten in de klas?
- Hoe stelt u doelen voor de leerlingen op?
- Hoe worden de doelen vertaald naar de praktijk?
- Welke verbeteringen zou u kunnen bedenken voor opbrengstgericht werken binnen de school?

Appendix 4 Guidance Interview Expert

Structure content audit kader

- Aan welke eisen moet een audit kader voldoen wat betreft de inhoud?
- Welke documenten worden gebruikt voor de invulling van een audit kader?
- Hoe beoordeelt u de betrouwbaarheid en validiteit van het audit kader?
- Waar moet je aan denken bij het ontwikkelen van het kader, zodat de gebruikers het meetinstrument hetzelfde gebruiken?
- Waar moet je aan denken om het instrument zo gebruiksvriendelijk mogelijk te maken?

Lay-out audit kader

- Waar moet je rekening mee houden bij het ontwerpen van een audit kader?
- Wat heeft u uit eigen ervaring als eisen gesteld bij het ontwikkelen van een audit kader?
- Waar moet je aan denken om het instrument zo gebruiksvriendelijk mogelijk te maken?

Appendix 5 Audit Framework

4.1 Prototype 1

OPBRENGSTGERICHT WERKEN De school gebruikt de opbrengsten om het onderwijs in te richten.	1. staat in kinder-schoenen	2. enigszins ontwikkeld	3. voldoende	4. voorbeeld scholen	vergelijking oordeel school	5. Niet beoordeeld
Praktijk						
1. De opbrengsten zijn op het niveau dat kan worden verwacht op basis van de karakteristieken van de leerling populatie						
2. De leerkrachten passen de leerinhoud, instructie, processen en leertijd aan op de verschillen in ontwikkeling tussen leerlingen						
3. De leerkrachten monitoren systematisch de voortgang van leerlingen						
4. Leerlingen die extra zorg nodig hebben, ontvangen dit						
5. Voor het bepalen van de resultaten van de leerlingen, wordt een leerlingvolgsysteem gebruikt						
6. De voortgang van de leerlingen wordt systematisch gevolgd en geanalyseerd met behulp van een leerlingvolgsysteem						
7. De effecten van de zorg die leerlingen krijgen op basis van (verwachte) uitval op grond van hun prestaties worden geëvalueerd						
8. De resultaten worden geëvalueerd						
9. Het onderwijsleerproces wordt geëvalueerd, in die zin dat de leraar ter verklaring van de resultaten in de eerste plaats kijkt naar de effectiviteit van zijn eigen onderwijs en niet zozeer naar de eigenschappen van de leerling(en)						
10. Leerkrachten stellen SMART en uitdagende doelen						
11. Er wordt een plan opgesteld om de doelen te bereiken						
12. Deze plannen worden in de praktijk uitgevoerd						
Bevorderende omgevingsfactoren						
13. De data toegankelijk voor leerkrachten is nauwkeurig, valide en betrouwbaar en wordt goed verdeeld over het schooljaar.						
14. De leerkrachten hebben een goede toegang tot data						
15. Er zijn voldoende middelen om van data gebruik te kunnen maken.						
16. De leerkrachten hebben een positieve houding ten opzichte van het gebruik van data.						
17. De leerkrachten hebben de kennis en vaardigheden om van data gebruik te maken.						
18. De leerkrachten hebben een interne locus of control.						
19. De leerkrachten zijn gemotiveerd om data te gebruiken.						
20. Er is voldoende tijd voor leerkrachten om data te gebruiken.						
21. Er is een data expert binnen de school.						
22. Er zijn trainingen voor leerkrachten met betrekking tot het gebruik van data.						
23. Leerkrachten werken samen in het gebruik van data.						
24. Het team heeft een gezamenlijke visie, normen en doelen met betrekking tot data.						
25. De schoolleider geeft het goede voorbeeld en is ondersteunend met betrekking tot het gebruik van data.						

4.2 Prototype 2

OPBRENGSTGERICHT WERKEN De school heeft een positieve houding ten opzichte van opbrengsten en gebruikt de opbrengsten om het onderwijs in te richten.	1. staat in kinder-schoenen	2. enigszins ontwikkeld	3. voldoende	4. voorbeeld scholen	vergelijking oordeel school	5. Niet beoordeeld
Observeren Klaslokaal met behulp van groepsmap						
1.De leerkrachten passen de leerinhoud, instructie, processen en leertijd aan op de verschillen in ontwikkeling tussen leerlingen (quality aspect 6)						
2.Leerlingen die extra zorg nodig hebben, ontvangen dit (quality aspect 8)						
3.Opgestelde plannen worden in de praktijk uitgevoerd (step 4).						
Toelichting:						
Vragen leerkrachtgesprek na afloop van les/ IB- gesprek (vraag hierbij om toelichtende materialen)						
Algemene vragen						
4.Voor het bepalen van de resultaten van de leerlingen, wordt een leerlingvolgsysteem gebruikt (quality aspect 9/indicator 1)						
5.De opbrengsten zijn op het niveau dat kan worden verwacht op basis van de karakteristieken van de leerling populatie (quality aspect 1)						
6.De voortgang van de leerlingen wordt systematisch gevolgd en geanalyseerd met behulp van een leerlingvolgsysteem (indicator 2, step 1, quality aspect 7)						
7.De effecten van de zorg die leerlingen krijgen op basis van (verwachte) uitval op grond van hun prestaties worden geëvalueerd (indicator 3)						
8.De resultaten worden geëvalueerd (indicator 4)						
9.Leerkrachten stellen SMART en uitdagende doelen naar aanleiding van de opbrengsten (step 2).						
10.Er wordt een plan opgesteld om de doelen te bereiken (step 3).						
Bevorderende omgevingsfactoren						
11.De data toegankelijk voor leerkrachten is nauwkeurig, valide en betrouwbaar en wordt goed verdeeld over het schooljaar.						
12.De leerkrachten hebben een goede toegang tot data.						
13.Er zijn voldoende middelen om van data gebruik te kunnen maken.						
14.De leerkrachten hebben een positieve houding ten opzichte van het gebruik van data.						
15.De leerkrachten hebben de kennis en vaardigheden om van data gebruik te maken.						

16.De leerkrachten hebben een interne locus of control (de leerkracht gebruikt resultaten om te kijken naar de effectiviteit van zijn eigen onderwijs)						
17.De leerkrachten zijn gemotiveerd om data te gebruiken.						
18.Er is voldoende tijd voor leerkrachten om data te gebruiken.						
19.Er is een data expert binnen de school.						
20.Er zijn trainingen voor leerkrachten met betrekking tot het gebruik van data.						
21.Leerkrachten werken samen in het gebruik van data.						
22.Het team heeft een gezamenlijke visie, normen en doelen met betrekking tot data.						
23.De schoolleider geeft het goede voorbeeld en is ondersteunend met betrekking tot het gebruik van data.						
Toelichting:						

4.3 Final Audit Framework

OPBRENGSTGERICHT WERKEN De school creëert een positieve cultuur ten aanzien van opbrengsten en gebruikt de opbrengsten om het onderwijs in te richten en te evalueren.	1. staat in kinder-schoenen	2. enigszins ontwikkeld	3. voldoende	4. voorbeeld scholen	vergelijking oordeel school	5. Niet beoordeeld
Leerlingniveau						
1. Leerlingen die extra zorg nodig hebben, ontvangen dit.						
2. Voor leerlingen met extra onderwijsbehoeften is een OPP en de resultaten worden laten zien.						
Groepsniveau						
3. Voor het bepalen van de resultaten van de leerlingen, wordt een leerlingvolgsysteem gebruikt.						
4. De leerkrachten passen de leerinhoud, instructie, processen en leertijd aan op de verschillen in ontwikkeling tussen leerlingen.						
5. De opbrengsten zijn op het niveau dat kan worden verwacht op basis van de karakteristieken van de leerling populatie.						
6. De voortgang van de leerlingen wordt systematisch gevolgd en geanalyseerd met behulp van een leerlingvolgsysteem.						
7. De effecten van de zorg die leerlingen krijgen op basis van (verwachte) uitval op grond van hun prestaties worden geëvalueerd .						
8. Leerkrachten stellen SMART en uitdagende doelen naar aanleiding van de opbrengsten.						
9. Er wordt een plan opgesteld om de doelen te bereiken.						
10. Opgestelde plannen worden in de praktijk uitgevoerd.						
11. De opgestelde plannen worden geëvalueerd.						
Schoolniveau						
12. De school heeft de resultaten van de leerlingen in beeld (ook ten opzichte van voorgaande jaren)						
13. De school stelt ambitieuze normen en doelen met betrekking tot het verhogen van de resultaten.						
14. De houding van werknemers ten opzichte van opbrengstgericht werken is optimaal.						
15. De kennis van werknemers ten aanzien van opbrengstgericht werken is optimaal.						
16. De schoolorganisatie is ondersteunend in het uitvoeren van opbrengstgericht werken.						

Bijlage

Voorbeeldvragen voor leerkrachten:

- Vind u dat de data nauwkeurig, valide en betrouwbaar?
- Vind u dat de toegankelijkheid van data goed verdeeld is over het schooljaar?
- Vind u dat u een goede toegang heeft tot data?
- Vind u dat er genoeg middelen zijn om van data gebruik te kunnen maken?
- Hoe is uw houding ten opzichte van het gebruik van data?
- Bent u gemotiveerd om data te gebruiken?
- Vind u dat u genoeg kennis en vaardigheden heeft om gebruik te kunnen maken van data?
- Gebruikt u de resultaten ook om te kijken naar de effectiviteit van uw eigen onderwijs?
- Heeft u voldoende tijd om data te gebruiken?
- Is er een data expert binnen de school waar u naartoe kunt voor vragen over het gebruik van data?
- Zijn er wel eens trainingen met betrekking tot het gebruik van data?
- Werken jullie als leerkrachten onderling samen in het gebruik van data?
- Wat vind u van de rol van de schoolleider in het gebruik van data?

Voorbeeldvragen voor interne begeleiders:

- Hoe vind u de houding van leerkrachten ten opzichte van data?
- Denkt u dat leerkrachten gemotiveerd zijn om data te gebruiken?
- Hoe schat u de kennis en vaardigheden van leerkrachten in om gebruik te maken van data?
- Is er een data-expert binnen de school?
- Zijn er teambreed een gezamenlijke visie, normen en doelen met betrekking tot data?

Toelichting: