



Developing leadership capacity for data-informed school improvement

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Developing leadership capacity for data-informed school improvement (DELECA)

THEORETICAL FRAMEWORK

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1 Introduction

The general aim of the DELECA-project is to develop school leadership capacity for evidence-informed school improvement. This will be effected by realizing specific objectives of the project: (1) To develop a curriculum for a training program for school leaders focused on data-driven school development; and (2) to develop a strategy for implementing the above mentioned program into the training of school leaders.

Following the training module school leaders are more competent in (1) building a culture of data use and (2) using data to improve instructional practice, school effectiveness and professional accountability¹.

This document elucidates the theoretical framework that can guide the development of this curriculum. The main goal of this theoretical framework is to account for the decisions we will take in order to develop the curriculum. These decisions concern, among other things:

- the meaning of the main concepts;
- a view on the use of data in schools and on the role of school leaders in using data from the staff;
- a view on the professional development of school leaders in general and on becoming data-wise in particular.

[In this document we formulate the [state of the art?], concerning those subjects.]

[In this document we apply the latest issues and developments related to these subjects. ?]

So, a theoretical framework that can guide the development of this curriculum must pay attention to topics such as:

- The policy context from which evidence-informed education and school development and the role of data in this development can be understood.
- The meaning of concepts such as data, information, knowledge, evidence-based or evidence-informed education and school development.
- Theories and practices of successful leadership in schools as a context for more specific school leader capacities.

¹ For a more extended description of the aims and objectives of the project, see the detailed description of the project.

- The specific school leader capacities for building a culture of data use and using data to improve instructional practice, school improvement and professional accountability.
- The goals and methods of professional development by which school leaders become more data-wise.

Furthermore, this text also functions as background information for the trainers of the program that will be developed.

2 Policy context

Generating and using data about different aspects of the school and school operation has a long tradition in *school organization development* (Dalin, 1983, Hall & Hord, 2006). But in the past decade, as a result of a policy of result-oriented education, more and more schools collect and use data *to improve student results*.

In many countries we see a movement towards result-orientation, decentralization and accountability.

One can situate this movement in the context of the idea of so-called *New Public Management* on the role of governments in welfare nations in general, and the changing relation between government and schools and changing responsibilities in particular (Pollit 1993; Hammersley, 2002). Government becomes more [restrictive in what it will do?][The role of government becomes more limited in terms of what it takes responsibility for?]. Schools become more autonomous but are expected to and are held accountable for achieving good results. In this context we can understand the (new) emphasis on data. Growing demands for school accountability also implies that schools are increasingly expected to *inform their external environment* on many aspects of their operations, especially as regards the *results of learners*. Schools – accountable for student results – must deliver data about these results. Underlying this policy direction is the assumption that greater attention to formal student test results, along with systematically collected information on related organizational conditions, will lead to more effective practices in classrooms and schools with a considerable payoff in the form of greater student learning (McDonnell, 2005).

This movement, emphasizing results and accountability, is subject to scientific critiques. Bottery (2004), Vandenberghe (2004) and Ravnich (2010), among others, point to weak or even negative outcomes of strong accountability programs, pointing to narrowed curriculums, de-professionalization, teaching explicitly for tests, even fraud.

As a consequence, we see efforts to combine an external accountability perspective and an internal development perspective. Policymakers and researchers have stressed the need for more responsive forms of accountability (Mulford, 2005). In some countries (e.g. Sweden, the Netherlands; Flanders) schools are expected to be able to generate and use *data for their own development*. If schools can validly demonstrate that they are performing well according to external (the inspectorate's) demands, schools will be confronted with fewer and less demanding inspections.

Some scholars look for more intelligent accountability programs and processes (Hopkins, 2008; Elmore, 2008). Elmore states that accountability systems work to the degree that they engage the knowledge, skills and commitment of people who work in schools. The success of accountability systems depends on what he calls practices of improvement: explicit strategies for developing and deploying knowledge and skills in classrooms and schools. A *practice* of school improvement has to go hand in hand with a *policy* of accountability. Barber (2002) describes the evolution of reform strategies. The period stretching from the 1970s up until the end of the century saw successive periods of uninformed professional judgement, uninformed and informed prescription. Barber sees the 2000s as an era of informed professional judgement: control of education once again in the hands of the educators but with the explicit requirement to be informed professionals. Earl & Katz (2006) point to the consequence of this informed professional judgement: using evidence and research to justify and support educational decisions.

Self-evaluation becomes an important way of manoeuvring beyond prescribed accountability programmes and earning autonomy (Geysel, Krüger & Slegers, 2010). This self-evaluation asks for the generation and use of data, but with a broader focus than the results of learners alone.

2.1 Consequences for the professional development of school leaders

As regards the professional development of school leaders, it appears necessary to support data-wise school leaders, who are not only skilled in generating and using data, but can also judge, in a critical sense, policies like this data-driven movement. Comments on (governmental) policy regarding data and the critical reactions to this policy in both science and practice make clear the necessity to inform school leaders about the policy of result-orientation, decentralization and accountability and the role data plays in this movement. This information can serve as a necessary background for the more technical and skill-oriented content of the curriculum.

Important parts of this information concerns:

- the policy context of accountability and focus on results of learners;
- critical reactions to this policy;
- the distinction between an external accountability perspective and an internal development perspective;
- the necessity for intelligent accountability systems, including broad self-evaluation.

3 Data, improved student results and school development

The impact of greater attention to formal student test results and systematically collected information on related organizational conditions is not clear. Nor do we know much about what district and school leaders are doing in the name of evidence-informed decision making or the conditions that either foster or inhibit the use of systematically collected data in their decision making (Anderson et al., 2010). Anderson et al. found some evidence that the availability of student assessment data in the context of current accountability requirements is moving school and district personnel to justify their goals and plans for improvement, focusing, in particular, on students and schools that are not meeting standards-based performance expectations and targets. Calman (2010) found that school effectiveness is strongly associated with the effective use of data at both the classroom and school levels. At the classroom level, in effective schools, teachers monitor student progress on a regular and on-going basis in order to provide both differentiated learning experiences and appropriate support to meet the needs of students. Assessing and tracking of progress are undertaken with rigour, and data is analysed with considerable care to identify students or groups of students who need specific help.

At the school level, effective leaders ensure that both outcome and process data are made available for use by school staff and that assessment data is integral to monitoring the attainment of school goals. When data is being used effectively, decisions regarding the focus of instructional programs and practices, professional learning needs, resource requirements, student support and placement of support staff are grounded in data analysis.

Also Hamilton et al. (2009) stress the importance of data applied at both the classroom and school levels. Using data systematically to ask questions and obtain insight into student progress is a logical way to monitor and effect continuous improvement and tailor instruction to the needs of each student. Armed with the data and the means to harness the information data can provide, educators can make instructional changes aimed at improving student achievement, such as: prioritizing instructional time, targeting additional individual instruction for students who

are struggling in particular areas of the curriculum, identifying individual students' strengths and instructional interventions that can help students continue to progress, gauging the instructional effectiveness of classroom lessons, refining instructional methods and examining school-wide data to consider whether and how to adapt the curriculum based on the given information.

Bryk et al. (2010) point to the importance of organization on student results. The organization of a school, including connections with parents and the community, works inside classrooms to promote learning. Important organizational variables – or as Bryk et al. call it, essential supports – include: an instructional guidance system (curriculum alignment, academic demand, instructional materials, literature, etc.); professional capacity (quality of professional development, normative dispositions and professional community); and leadership as the driving subsystem for improvement (with managerial, instructional and inclusive-facilitative dimensions, i.e. nurturing individual agency, building collective capacity, inspiring teachers, students and parents). The research of Bryk et al. makes clear the systemic character of these organizational variables and their importance for student learning. A school's capacity to improve student learning derives from its overall organizational strength across all of the essential supports. Schools strong in the most essential support areas were at least ten times more likely than schools weak in most support aspects to show substantial improvement in both reading and mathematics.

In the former section, we describe the distinction between an *accountability perspective* and an *improvement and development perspective*. Here we can introduce a second distinction:

data is used with an emphasis on improving *students results* with an emphasis on *developing the school*.

So we can distinguish between four perspectives in using data: (1) from an *accountability perspective* with a focus on student results; (2) from an *accountability perspective* with a focus on the function of the school; (3) from an *improvement and development perspective* with a focus on student results; and (4) from an *improvement and development perspective* with a focus on the school (see figure 2).

	Accountability	Improvement and development
Student results	1	3
School	2	4

Different perspectives require different data for collection and interpretation. From the perspective of accountability, there is an emphasis on student results, though process and other outcomes (i.e. financial results) can also be important from an accountability perspective. From the perspective of improvement and development, more different data is generated with a view to the impact of organizational conditions on student learning.

Different perspectives lead also to handling data differently. For example, using data with a focus on improvement and development requires that school leaders involve other staff or stakeholders in processes of interpreting and engaging with the data to stimulate an internal sense of urgency, to make time for data interpretation, and for arriving at a sense of collective meaning and commitment, and to use critical friends. This is, strictly speaking, not necessary when the only goal behind using data is to account for student results, e.g. at the request of the inspectorate. But, as we have seen, the success of accountability systems depends on practices of improvement.

Combinations of these different perspectives may appear possible. For example, schools can collect, interpret and use data both to improve student results and school function. Schools can also combine an accountability perspective and a development perspective and use the data for external stakeholders to account for student results and at the same time, internally, at the school, use the data in a process aimed at improving these results.

In this project we will emphasize the *improvement and development perspective*, without excluding the accountability perspective. On the one hand, it goes further than merely delivering data on student results alone, as it also includes processes of interpreting and engaging with the data together with the staff in order to improve the school and student learning. On the other hand, as was indicated above, policy makers and researchers increasingly stress the need for more responsive forms of accountability, aiming not just at being accountable but also, and foremost, aiming at the *improvement and development* of both student learning and the school.

In this project we also focus on data that is both more directly and more indirectly related to learning and student results. Learning about both the generation and use of data on student learning as well as on school organization variables (incl. context variables) is important. In a later section we will pay

more attention to the question of what constitutes the interesting features of a school; and as consequence, what interesting data school leaders need to handle.

3.1 Consequences for the professional development of school leaders

Following the remarks in the former section about the consequences for the professional development of school leaders, we can stress here that such training has to contribute to data-wise school leaders, who are not only skilled in generating and using data but also aware of possible important distinctions regarding data and the improvement of student learning and schools. In the professional development of school leaders, it is necessary to pay attention to:

- the importance and relevance of data in developing student learning and the development of the school;
- the distinction between and interdependency of data aimed at improving student *results* or for *developing the school*;
- the importance of engaging the staff in using data with an emphasis on the developmental approach.

4 Data, information, evidence and other concepts

The emphasis on results and data in the educational policy of many countries has led to the introduction of different concepts and meanings of these concepts. Terms such as data, information, knowledge, evidence and so on become part of the conversation between school leaders, teachers, policy makers and other educational stakeholders.

Without much discussion we will elucidate here the meaning of some important concepts as we have used them in the context of this project.

4.1 Data, information, knowledge, understanding and wisdom

For many years, a distinction between data, information, knowledge, understanding and wisdom was made (Ackoff 1989). Sometimes – when one excludes the *understanding* component – one speaks of the DIKW hierarchy. Also in the context of data use in education one comes across this distinction (i.e. Vanhoof, Mahieu & Van Petegem, 2009; Schildkamp, Ehren & Lai, 2012). *Data* is then the symbolic representation of figures and quantities. *Information* contains data that is processed to be useful, providing answers to the questions of "who", "what", "where", and "when". *Knowledge* concerns the application of data and information and provides answers to "how" questions. *Understanding* refers to the appreciation of "why", while *wisdom* concerns an evaluated understanding (Ackoff, 1989). But there are also other uses or application for these concepts. For example, Weggeman (1997) sees data as a set of raw facts. Information then is a collection of facts, which are organized in a specific context; it has a collective value more than the value of the fact itself. Knowledge is a personal ability, which is the product of information, individual experiences and skills, together with attitude, that an individual, at a given moment, displays. In OLS (2011) one sees data – words, numbers, and observations – quite simply as information that is collected and organized in a systematic way by educators and can be used to make instructional or organizational decisions. And Copland et al. (2009) speak of data as information, meaning that this represents the content or conduct of instruction or its effects on student learning and the student experience, as well as the factors and conditions that most immediately affect these inputs.

In this project, following the description in OLS (2011), we will use the term *data* in a rather broad sense: data – words, numbers, and observations – as information that is collected and organized in a systematic way by educators and can be used to make instructional or organizational decisions. We also will follow the international use of terms like data-wise, data-literate, data-informed and so on. We use these terms in referring to the capacity to generate, give meaning to and use data – also in a critical sense.

4.2 Evidence

In recent years we have seen an effort to close the gap between research, policy and practice in education (and in other disciplines) by improving the contribution of research to policy and practice (Onderwijsraad, 2006; OECD, 2007). In striving for better results, more and more policymakers and educational scientists lay emphasis on evidence. Data, information and knowledge regarding (SES, ethnic and cultural) student characteristics and results, as well as the relation between these characteristics, results and teacher approaches play a big role in delivering evidence.

Hargreaves (1996) referred to evidence as information that verifies effective practice.

Some scholars (e.g., Hargreaves, 1996; Slavin, 2002) advocate for an increased use of data as evidence for educational decision-making. In their view, education must become *evidence-based*. Evidence-based education is a paradigm by which education stakeholders use empirical evidence to make informed decisions about education interventions (policies, practices, and programs). The overall goal of the accountability movement is, in the opinion of Kowalski (2009), to make evidence-based practice normative.

According to Davies (1999) evidence-based education requires: (1) utilizing existing evidence and (2) establishing new evidence where current evidence is insufficient or non-existent. But although *evidence-based education* seems an attractive notion, there is also a lot of criticism of the approach.

Here we can refer to the distinction between empirical evidence and practical knowledge (Cochran-Smith & Lytle, 1999; Connelly & Clandini, 1999; Verloop, 2003; Kowalski, 2009). Empirical evidence refers to verification embedded in espoused theories, especially those that were developed from controlled, quantitative studies, although other, less stringent methods also can produce empirical evidence (Onderwijsraad, 2006). Practical knowledge (applied theories, action theories, practical or professional wisdom) is developed in practice and based on relevant experiences educators have in and outside schools (Osterman & Kottkamp, 1993).

Hammersley (2001, 2002; see also Biesta, 2007) points to misconceptions about the nature of both research and practice, which are built into the very assumptions on which they operate. There is too much confidence accorded to the truth or validity of research findings, both in abstract terms and in comparison with knowledge arising from professional experience. And one assumes that research can play a far more direct role in relation to practice than is thought usual. They tend to treat practice as the application of research-based knowledge, neglecting the extent to which it necessarily involves uncertain judgment. Also Timperley & Earl (2009) notice that advocates of evidence-based education see the relation between collecting data and using it as evidence for improvement purposes as relatively unproblematic. But there are serious difficulties involved in the use of research evidence by practitioners. One relates to problems in interpreting this evidence without background knowledge of the studies from which it arose. Transforming data into usable evidence and knowledge for educational improvement requires engagement in complex technical and interpersonal processes. Well-constructed conversations can facilitate these processes by collectively identifying the relevance and meaning of the evidence through cyclical processes of questioning, interpretation and review.

In essence, practitioners need the ability to think beyond the parameters of technical knowledge (Schön, 1983; Kowalski, 2009, Copland, et al. 2009). One danger in relying on evidence-based-education is the preference given research evidence over evidence from other sources, especially professional experience. Another concerns the question of how contradictions between research evidence and professional experience are to be resolved.

Anderson et al. (2010) express a growing concern that a “data-driven decision-making” concept of how to improve schools is in danger of seriously misrepresenting and underestimating the challenges schools face in their effort to improve education. The term “decision making” implies that the improvement challenge for schools is to choose among a set of known solutions for their readily understood improvement problems – a view endorsed by educational policies encouraging schools to select, for example, reading or math programs with “proven” effects on students. They prefer the term “problem solving” rather than “decision making”. This invokes a more accurate picture of the improvement challenge faced by most educational leaders and their teacher colleagues. Systematically collected data plays a potentially important yet decidedly limited role in such problem solving. It seems likely that sophisticated school staffs, faced with comparable challenges, engage in quite a bit of “informal reasoning” – lots of tacit knowledge artfully combined with rational thought. Anderson et al (2010) worry also that a laser-like focus on large amounts of systematically collected data might increase the power of “single-loop learning” (refining current understandings and practices without changing assumptions) but significantly discourage “double-loop learning” (challenging the assumptions on which current understandings and practices are based).

In response to this criticism some prefer to speak of *evidence-informed practice* and *data-informed educational leadership* (Copland et al., 2009 – see below; Hargreaves & Fullan, 2012). Davies (1999) gives the following definition of *evidence-informed practice*: ‘the integration of experience, judgment and expertise with the best available external evidence from systematic research.’ This suggests a more reasonable view of the relationship between research and practice, but is at odds with the radical role that is ascribed to research by the evidence-based practice movement².

In this project we will focus on how to develop school leadership capacity for evidence-informed improvement of student results and for evidence-informed school development. This means not an exclusive appeal to scientific evidence in the process of educational decision-making, but the integration

² For Hammersley (2002) the label *evidence-informed practice* remains a rather obscure label.

of evidence with the judgement and expertise of the practitioner. It also means an emphasis on professional conversations: the collectively identifying the relevance and meaning of the evidence through cyclical processes of questioning, interpretation and review by professionals involved in the practice of making education better³. In this respect we can point to the importance of processes of organizational learning, described by scholars like Dixon (1999), Nonaka & Takeuchi (1996), Crossan, Lane & White (1999) Hord (1997) and Verbiest (2004, 2012).

Here we can also say a few words about the methodological status of evidence school leaders need. Following the Dutch Education Council (Onderwijsraad, 2006), not only hard evidence from random controlled tests (so called RTC's) but also research approaches such as case studies, cohort studies and pilot studies can generate useful evidence. Of course, it is important that those using the evidence know something about the validity and reliability of the evidence they use.

4.3 Consequences for the professional development of school leaders

The professional development of school leaders – with the aim to make them more data-wise – asks, to begin with, that school leaders know about the terminological and conceptual distinctions between data, information, knowledge and so on. Secondly, the same goes for the concept of evidence. It is important here to elucidate the important views on using data and evidence in making instructional or organizational decisions. Thirdly, in emphasizing the development of school leadership capacity for evidence-informed improvement of student results and for evidence-informed school development, it is also important to stress the development of the competency of school leaders in engaging in professional conversations: the collective identifying of the relevance and meaning of evidence through cyclical processes of questioning, interpretation and review by professionals involved in the practice of making education better. Finally, it is important that school leaders be able to reflect critically on the data and, consequently, are able to distinguish between the different sources of data (RTC's, case studies and so on) and can make good judgements as to the validity and reliability of the data. In other words, school leaders must know how to understand data on the wisdom-level.

³ In this sense, although the name of this project refers to the term data-informed, our focus is the less narrow perspective of evidence informed development.

5 Data

In theory, schools and policy actors have access to numerous sources of data to inform their policy, and data – both quantitative and qualitative – can take many forms (Copland et al, 2009), including:

- *Student demographics*: enrolment, attendance, dropout rate, ethnicity, gender, grade levels, trends in student population and learning needs, school and student profiles, data disaggregated by subgroups;
- *Perceptions* of learning environment, values and beliefs, attitudes, observations . . . (e.g., held by a school's teachers);
- *Student learning*: standardized tests, norm/criterion-referenced tests, teacher observations, authentic assessments, learning skills and work habits, student work samples. An interesting distinction here can be made between results (students), learning gain (of students, inside a certain time interval and adjusted value by the school. When we talk about results, we do not restrict ourselves to academic excellence in language, mathematics and science. Results of student learning can be seen as far broader, i.e. as responsible citizenship (awareness and concern for oneself, others, and the environment); communication competencies (the ability to communicate through a variety of media); reasoning and problem solving competencies and so on;
- *School processes*: descriptions of programs, instructional strategies, classroom practices;
- *Teacher characteristics, behaviour and professional learning*: Teacher assignment (grade, subject area, students served), qualifications, retention, participation in professional development;
- *Environment data* such as parent/community surveys.

Vanhoof & Mahieu (in the press) state that the data to which schools have access must first and foremost consist of information relevant for the schools. In order to map the broad range of data the authors created a framework based on two dimensions. That framework is based on two dimensions: (1) Important characteristics of the education: context, input, process and output; and (2) the level on which that information is or could be provided. For the first dimension they make use of the CIPO model (Scheerens, 1990), the acronym standing for 'context', 'input', 'process' and 'output'. 'Context' means the environment: all factors the school has to deal with without being able to directly influence them. 'Input' is the way that environment enters the school: the character of the pupils, teachers,

parents and management. In short, this relates to the capacities and competencies of the people who together make up the school. ‘Process’ refers to the way people work together. That process ultimately delivers results, referred to by the term ‘output’.

For the second dimension, they distinguish between four levels: ‘macro’, ‘regional’, ‘meso’ and ‘micro’. By ‘macro’ they mean all data relating to or generated at the international or national level. By ‘regional’ they mean the local educational level. This may be a group of schools in a district. ‘Meso’ is the school level. ‘Micro’ is the most clearly describable: it is the world of the student in relation to the teacher: the class. But here, too, the class should certainly not be limited to the class-as-room.

The combination of these two criteria produces a framework that can be employed to assess at what level information is or should be available. That framework is visualised in figure 5. The authors presume that if the essence of education (the cells shaded darker) is to be given form in an evidence-based or evidence-informed way data is needed about a lot of other domains (shaded lighter) that appear to be further removed. Also the earlier mentioned perspective of development (of results and of the school) requires more information than the results alone.

Figure 2: The CIPO-MRMM framework

	C Context	I Input	P Process	O Output
Macro				
Regional				
Meso				
Micro				

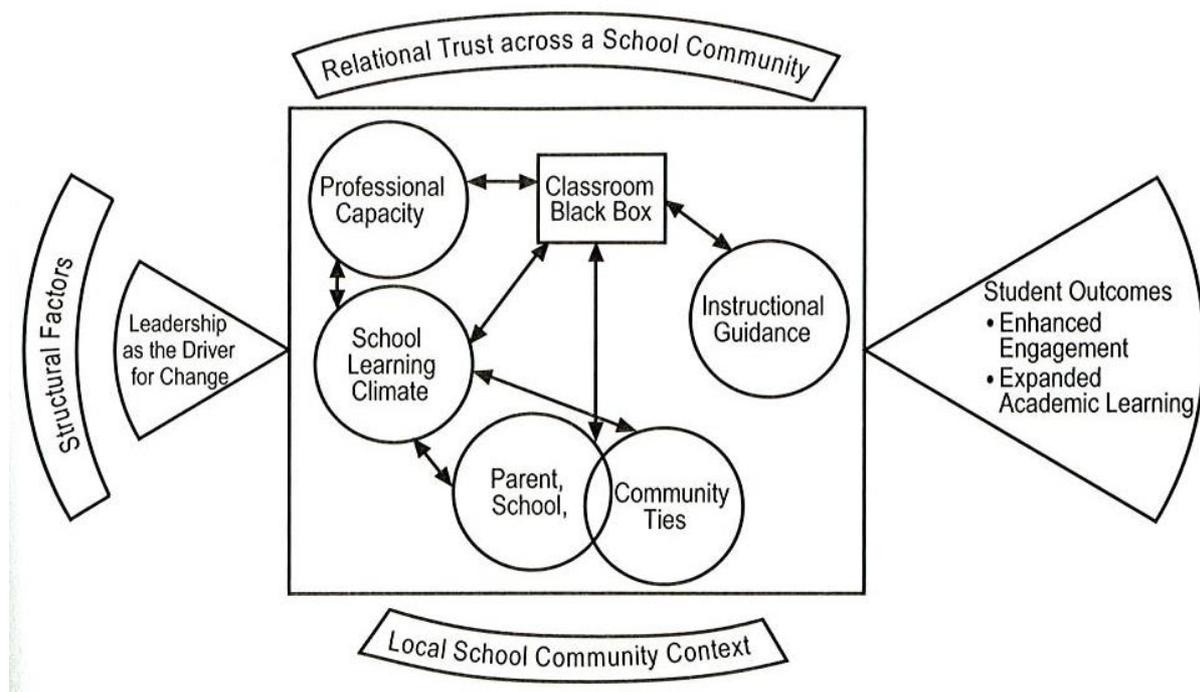
This short excursion reveals the risk of an overload of data for school leaders. Data can refer to different topics, like student results or teacher characteristics; also context, input, processes or output; and data can be generated on different levels, for example on the level of individual students in a classroom or on the national level (like PISA or TIMMS).

In order to bring some focus (on the development of learning results and school organization) school leaders need a framework (a theory or model) that connects the school organization to classroom

instruction and to student results. With the help of such a framework school leaders can decide on the generation of data that relates to the (most) important variables of classroom instruction and school organization.

As an example we point here to the model of Bryk *et al.* (2010). Based on theory and research the authors bring together five so-called *essential supports*: school leadership, parent-community ties, professional capacity, learning climate and instructional guidance (see figure XX). These five essential supports form the foundation for improving student learning. At the same time, these core supports are anchored within a context unique to each school—a climate of relational trust, the school’s organizational structure, and resources of the local community. The five pillars in the model are elaborated in fourteen indicators.

Figure 3: Framework of essential supports (Bryk *et al.*, 2010)



5.1 Consequences for the professional development of school leaders

Following Vanhoof & Mahieu (in the press) we start from the idea that relevant data is that data most relevant for school leaders, i.e. data that can help them make decisions related to improving student learning and school organization. Even so, there is still a lot of data school leaders are interested in: all

of the kinds of data we summed up in the beginning of this section – data on the micro, meso and regional levels, and data on context, input, processes and/or output.

In order to become data wise, school leaders need an overview of the most important data – who is available [?] and where the data can be found or generated. But more important is that school leaders have at their disposal a framework that connects school organization to classroom instruction and to student results. Only such a framework makes it possible for school leaders to make decisions regarding the generation of data as it relates to the important variables of classroom instruction and school organization.

6 Successful leadership

So far, we have paid particular attention to topics such as: why is there now an emphasis on the use of data? What is the focus of the use of data? What kind of data and evidence is there? How can a school leader select data. In other words, we focused on data. Now we turn to data-wise school leaders: what are they doing, and what are the important competencies of data-wise school leaders? These competencies can guide the curriculum we are developing.

We start with some general remarks about successful leadership as a background for more specific competencies of data-wise leaders. These general remarks will lead us to the conclusion that successful leadership asks for involvement of staff, supporting their professional development and the working together of school leaders and staff in order to improve the instructional process and the development of the school.

Although leadership has become a priority in education policy agenda internationally (Pont, Nusche & Moorman, 2008) and has become a concept of increasing importance in education literature, there remains very little consensus as to what leadership is and what it comprises. Leadership may be conceived as a process of influence, as a process of leading and following, as a matter of personality, a way of persuasion, a manner of interacting, a process of goal attainment, a way of creating structure, as negotiation in power relations and as stimulating change (Krüger & Scheerens, 2012). Leithwood, Jantzi & Steinbach (1999) found no less than 20 different concepts of school leadership, including: instructional leadership, transformational leadership, moral leadership, constructivist leadership, servant leadership, cultural leadership, emotional leadership, sustainable leadership and poetic leadership (see also Davies, 2005). These *leadership by adjective* approaches (Leithwood et al., 2004) are growing.

But the effectiveness of most concepts of school leadership lacks empirical foundation (Krüger & Scheerens, 2012).

Leithwood et al. (2006) describe, based on a review of literature, the “core practices” or “basics” of successful school leadership. The four broad categories of practices identified in the research includes:

- *setting directions*: (building a shared vision; fostering the acceptance of group goals; high performance expectations);
- *developing people*: (providing individualized support/consideration; intellectual stimulation; providing an appropriate model);
- *redesigning the organization*: (building collaborative cultures; restructuring; building productive relationships with families and communities; connecting the school to its wider environment);
- *managing the instructional (teaching and learning) program*: (staffing the program; providing instructional (teaching and learning) support; monitoring school activity; buffering staff from distractions in their work).

Many of these core practices have their origins in two different models of leadership (Leithwood et al., 2006; Scheerens, 2012): *instructional leadership* and *transformational leadership*.

One influential approach of school leadership is *instructional leadership*. Instructional leadership models emerged in the early 1980s from research on effective schools. The effective school movement stresses a strong, directive leadership focused on curriculum and instruction from the principal (Hallinger, 2003). There are restricted and more extended conceptions of instructional leadership (Shepard 1996). The more narrow of definitions focuses on those actions directly related to teaching and learning – observable behaviours such as classroom supervision – where the latter also involves variables such as school culture, which may have important consequences for teacher behaviour. In the broad view, instructional leadership entails all leadership activities that affect student learning. In this project, we restrict instructional leadership to the narrow view: instructional leadership focuses on teaching and learning and on the behaviour of teachers in working with students (Bush & Glover, 2003).

Instructional leadership was criticized, among others, for conceptual vagueness. Leithwood & Duke (1999; see also Kelchtermans & Piot, 2010) point to the lack of explicit descriptions of instructional leadership in the literature and suggest that there may be different meanings of this concept.

In the 1990s interest in instructional leadership waned; and the concept of *transformational leadership* became increasingly important. For one reason, the top-down character of instructional leadership was considered as less well suited to the development of school organizations, stressing teachers' professionalism and involvement. As a transformational leader, the school leader inspires teachers to be engaged in their work by developing and articulating a vision; shows concern and respect for the personal needs of teachers; stimulates a culture of collaboration; improves the processes of problem solving in the school and challenges teachers to develop themselves in the context of the development of the school (Leithwood, 1992; Leithwood, Tomlinson & Genge, 1996). Transformational leadership focuses on developing the organization's capacity to innovate rather than focusing specifically on direct coordination, control, and supervision of curriculum and instruction. Transformational leadership is distinguished from transactional leadership (Yukl, 2006). In this last type of leadership there is some exchange between leader and follower, like the exchange of productivity for income.

Despite the popularity of transformational leadership there are also criticisms. The concept has different meanings, and it is not always easy to differentiate between all components of the concept. Also, there is some overlap between components of transformational and transactional leadership (Bush & Glover, 2003; Yukl, 2006; Kelchtermans & Piot, 2010). Furthermore, the concept of *transformational leadership* neglects processes of mutual influence and distributed leadership (Gronn, 2003a, b).

The lack of an explicit focus on the instructional process in transformational leadership theories stimulated the revival of instructional leadership. Apart from that, the recent interest in the improved learning and student results in the education policies in many countries also serves to stimulate this revival. Recent research points to the effectiveness of instructional leadership (Robinson, Lloyd & Rowe, 2008). But this instructional leadership is affected by theories of transformational and distributed leadership. In other words, in the concept of leadership one sees a growing integration of the main theories on leadership. Marks & Printy (2003) re-conceptualize instructional leadership into *shared instructional leadership*. This leadership involves the collaboration of principals and teachers on curriculum, instruction and assessment. The school leader stimulates the involvement and development of teachers and works together with them to improve the instructional process. The principal is not the sole instructional leader but the leader of instructional leaders (the "primus inter pares"). We can talk about the school leader as a teacher of the teachers (Verbiest, 2000) or new instructional leadership (Verbiest, 2010). Southworth (2003) refers to learning-centred leadership. This leadership is focused on how leaders influence what happens in the classrooms. This most important task of school leaders is distinctive for its idea of school leadership (compared with other organisations). Three things distinguish this leadership: monitoring, evaluating the quality of teaching, and taking steps to improve the quality of teaching.

Furthermore, research by Marks & Printy (2003) shows that transformational leadership is a necessary condition of instructional leadership. Principals, not acting as transformational leaders, will not succeed in collaboration with teachers in improving the instructional process. School leaders who score high on instructional leadership also score high on transformational leadership. But transformational leadership is not sufficient. A high score on transformational leadership does not imply a high score on instructional leadership. Shared instructional leadership will not develop unless it is intentionally pursued and fostered.

We conclude that instructional leadership is important. But it is no longer the “old” instructional leadership, from the top-down, emphasizing the principal’s coordination and control of instruction and controlling organizational members to move towards a predetermined set of goals. Rather it is “new” instructional leadership (Verbiest, 2000, 2010) or learning centred leadership (Southworth, 2003), whereby the school leader involves the teachers, supports their professional development, and works together with them in order to improve the instructional process and the development of the school.

6.1 Consequences for the professional development of school leaders

Focused on working with data means that school leaders stimulate, in a critical sense, teachers to generate data, to give meaning to data and to use data, with the aim to improve. Studies by Boudett, City & Murnane (2005) and Katz, Earl & Jaafar (2010) confirm that those school leaders who are most successful in using data effectively are those who engage their school staff in collaborative decision-making. According to Kowalski (2009) educators are more likely to accept evidence-based practice in the context of learning communities so that they are able to (a) accurately define the problems that need to be addressed; (b) identify their primary information needs; (c) learn to create, evaluate, and apply evidence; (d) integrate various forms of evidence and values, (e) value experimentation and risk, and (f) evaluate the effectiveness of their decisions. Also Anderson et al (2010) emphasize that it is not data use per se that affects the quality of teaching and learning; rather it is the appropriateness of actions actually taken based on data-informed decisions about the nature of the problem and how it might be solved. In other words, it is not the data per se but the problem-solving capacity of the organization that plays a decisive role. According to Barber (2002), school leaders and teachers must become *informed professionals*. Fullan (2005), referring to the work on professional learning communities, stresses that this informed professionalism must be understood as a collective quality with strong external connections to the wider environment of knowledge.

Consequently, professional development of school leaders must contribute to the development of characteristics of instructional, transformational and shared leadership. Important then are a focus on the learning process and student results and on the teachers' instructional process. It also requires that the school leader integrate the process of generating and using data in a process of organizational learning in order to help teachers learn about data. As a consequence, more specific competencies of data-wise school leaders, such as "Being able to provide explanations of the strengths and weaknesses of their own school, as these appear from the data" have to be complemented by the competency to guide teachers to become data wise (and in this example "Being able to guide teachers to provide explanations of the strengths and weaknesses of their own school, as these appear from the data").

7 Data-wise leadership: activities, roles and competencies

In general, one can say that one expects of school leaders to be data-wise or data-literate (Earl & Katz, 2006; Earl & Timperley, 2009). Hamilton et al. (2009) define data literacy as "... the ability to ask and answer questions about collecting, analysing, and making sense of data." In their view, widespread data literacy among teachers, education leaders, and students is a salient characteristic of a data-driven school culture. Copland et al. (2009) state that data literacy presumes more than trial-and-error experience with data, but rather an accumulating facility with the interpretation of data, not to mention familiarity with data sources and creativity in assembling relevant data quickly and efficiently.

Because leaders' productive work with data implies more than laying out test scores, noting areas of weakness, and mounting remedies that address patterns in the data, Copland et al. (2009) suggest the concept of *data-informed educational leadership*. This term broadens the scope of thinking and action in two productive ways: first, it escapes the sometime deterministic implication of data "driving" action (see also our discussion of evidence-based and evidence-informed education or practice). While they can be fully knowledgeable of available data when taking action, wise leaders also bring to their work certain core values and insights into those aspects of practice for which there is not yet good data, and may never be. Second, the concept presumes that data is useful for more in the practice of leadership than the making of decisions, per se. Given the inherent ambiguity and multiple meanings of a lot of data in educational settings, data may prompt questions and deliberation more than point to specific decision options. Data can of course inform conversation about possible actions, but does not necessarily "drive" decisions or provide information about how best to address the issue at hand – for example, poorer performance by boys than girls.

Copland et al. (2009) describe a range of actions of school leaders, using data (Table 1).

Table 1: A range of ways that educational leaders use data (Source: Copland et al., 2009)

Type of leadership activity (with and for internal or external audiences)	How data are used and what kinds of data are implied
Diagnosing or clarifying teaching and learning problems (primarily internal to the decision-making group).	Seeking to know whether, or to what extent, student learning matches those overarching expectations (standards) established at the top of the system, leaders seek out information that reflects one measure of student learning in particular content areas.
Weighing alternative courses of action (primarily internal).	Leaders use data to evaluate existing programs or curriculum approaches, and (where they have relevant data) judge its potential in comparison with alternative programs.
Justifying chosen courses of action (primarily external).	Data (e.g., concerning learner characteristics, learning outcomes, comparative program benefits, school closure decisions) are used selectively to “make a compelling case” for programs or courses of action that may or may not have been chosen on the basis of the data.
Complying with external requests for information (external).	Leaders are careful to generate information requested by external agencies, authorities, or groups providing funding; for example, descriptions of how different learner groups are served, evaluations of services to these groups.
Informing daily practice (internal).	Data is used by administrators and teachers to guide daily practice. The data is often informal, gathered in mid-stream, and in a form that can be immediately interpreted and used by the practitioner for refining teaching and learning.
Managing meaning, culture, and motivation (internal).	Data helps leaders understand and guide the cultural aspects of the professional workplace, by representing to staff what the organization is accomplishing, how people feel about their work, what matters in the work, and what professional learning needs exist.

In conclusion, school leaders (and teachers) have to develop specific capacities to generate and use data. Earl and Katz (2002, 2006) distinguish three capacities for leaders in the data-rich world:

- *Develop an inquiry habit of mind.* School leaders do not have to become researchers themselves, but they need to be able to read, understand and interpret data, to commission research, to lead the research processes in their schools, and to initiate dialogues in their schools in order to make sense of data together. Leaders will need to reserve judgment and have a tolerance for ambiguity, to value deep understanding and take a range of perspectives and systematically pose increasingly focused questions.
- *Become data literate.* Leaders will need to be aware of needing different data for different purposes, to recognize sound and unsound data, to be knowledgeable about statistical and measurement concepts, to recognize other kinds of data (not only numbers, but also opinions, anecdotes, observations), to make interpretation paramount (instead of using data for quick fixes), and to pay attention to reporting to different audiences.
- *Create a culture of inquiry.* Leaders will need to involve others in interpreting and engaging with the data, to stimulate an internal sense of urgency (refocusing the agenda), to make time for data interpretation and to arrive at collective meaning and commitment, and to use critical friends. Hamilton et al (2009) describe a data culture as a learning environment within a school or district that includes attitudes, values, goals, norms of behaviour, and practices, accompanied by an explicit vision for data use by leadership that characterises a group’s appreciation for the importance and power that data can bring to the decision-making process.

OLS (2011) describes practices and corresponding competencies of effective data use by school leaders as they are embedded in The Ontario Leadership Framework. The main domains of this framework have already been mentioned: “core practices” or “basics” of successful school leadership (Leithwood et al., 2006) - *setting directions; developing people; redesigning the organization and managing the instructional (teaching and learning) program* - supplemented with a fifth core practice: *securing accountability*. Table 2 illustrates how the effective use of data is embedded in the Ontario Leadership Framework.

Table 2: Effective data use – capacities embedded in the Ontario Leadership Framework (OLS, 2011)

DOMAINS OF THE OLF	SAMPLE PRACTICES	SAMPLE COMPETENCIES – SKILLS, KNOWLEDGE & ATTITUDES
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<p><i>Setting Directions</i></p>	<ul style="list-style-type: none"> ○ Ensures the vision is clearly articulated, shared, understood and acted upon by all ○ Works within the school community to translate the vision into agreed objectives and operational plans which promote and sustain school improvement ○ Ensures creativity, innovation and the use of appropriate technologies to achieve excellence. 	<ul style="list-style-type: none"> ○ Thinks strategically, and builds and communicate a coherent vision in a range of compelling ways ○ Models the values and vision of the board ○ Knows and understands new technologies, their use and impact ○ Demonstrates commitment to setting goals that are not only ambitious and challenging, but also realistic and achievable
<p><i>Building Relationships and Developing People</i></p>	<ul style="list-style-type: none"> ○ Engages staff in professional learning ○ Acknowledges and celebrates the achievements of individuals and team ○ Encourages colleagues to take intellectual risks ○ Leads by example, modelling core values 	<ul style="list-style-type: none"> ○ Communicates effectively with a diverse range of people, including the public and the media ○ Encourages colleagues to take intellectual risks ○ Knows and understands the impact of change on organizations and individuals ○ Demonstrates commitment to shared leadership for improvement
<p><i>Developing the Organization</i></p>	<ul style="list-style-type: none"> ○ Builds a collaborative learning culture within the school and actively engages with other schools to build effective learning communities ○ Uses performance appraisal to foster professional growth ○ Develops a school culture which promotes shared knowledge and shared responsibility for outcomes 	<ul style="list-style-type: none"> ○ Perceives the richness and diversity of school communities ○ Listens to and acts on community feedback ○ Builds and sustains a professional learning community ○ Knows and understands change management strategies
<p><i>Leading the Instructional Program</i></p>	<ul style="list-style-type: none"> ○ Ensures a consistent and continuous school-wide focus on student achievement, using system and school data to monitor progress ○ Ensures that learning is at the centre of planning and resource management ○ Develops professional learning communities to support school improvement 	<ul style="list-style-type: none"> ○ Can access, analyse and interpret data ○ Can make organizational decisions based on informed judgments ○ Knows and understands tools for data collection and analysis ○ Knows and understands school self-evaluation ○ Demonstrates commitment to raising standards for all students

Using evidence in practice is often described as a process in different stages, such as problem framing, diagnosing, action planning, intervention and evaluation (Van Strien, 1986). Kowalski (2009) describes the required practitioner expertise related to stages of evidence-informed practice. These stages are: (1) forming answerable questions; (2) finding best evidence; (3) evaluating evidence; (4) integrating evidence with tacit knowledge and values and (5) evaluating decision outcomes and making adjustments. Practitioners must be able to identify their evidence needs accurately. In addition, practitioners

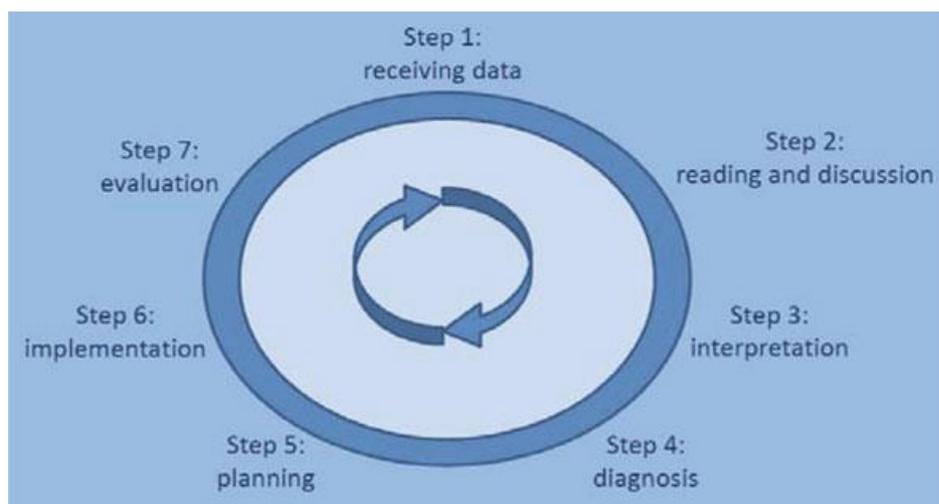
<p><i>Securing Accountability</i></p>	<ul style="list-style-type: none"> ○ Measures and monitors teacher and leader effectiveness through student achievement ○ Aligns school targets with board and provincial targets ○ Develops and presents a coherent, understandable, accurate and transparent account of the school’s performance to a range of audiences (e.g. ministry, board, parents, community) ○ Participates actively in personal [personnel?] external evaluation and makes adjustments to better meet expectations and goals. 	<ul style="list-style-type: none"> ○ Collects and uses a rich set of data to understand and assess the strengths and weaknesses of the school ○ Knows and understands a range of evidence to support, monitor, evaluate and improve school performance ○ Demonstrates commitment to individual, team and whole-school accountability for student outcomes
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must possess other requisite application skills. Specifically, these include (a) the ability to access, evaluate, and use information in a timely manner, (b) a commitment to relying on multiple sources of evidence, and (c) a commitment to evaluate outcomes objectively.

Vanhoof et al. (2013) – analysing relevant literature (Williams & Coles 2007; Earl & Fullan, 2003; Webber & Johnston, 2000 ; Bosker et al., 2007) – perceive data literacy as a competency. This competency, in the first instance, encompasses the strategies, skills and knowledge needed to define information needs, and to locate, evaluate, synthesize, organize, present and/or communicate information as needed. Second, the concept of data literacy competencies also requires the explicit attention to attitudes to data use because the attitude of users with regard to data use determines in large measure the extent to which they are prepared to invest time and effort into using the information.

Also Vanhoof et al. (2013) describe the required practitioner competencies related to stages of evidence-informed practice. Successful data use involves a number of consecutive steps (Fig. 6), in two main phases. First, receipt, reading, and discussion of the school feedback as steps in the process of arriving at a correct interpretation. This is then followed by a feedback use phase, including a diagnosis (in looking for explanations for the results), planning, implementation and evaluation. The emphasis made on distinguishing between “interpretation” and “use” is a result of the finding that schools often get stuck when it comes to moving from interpretation on to planning and policy implementation.

Figure 4: Steps in school feedback use (Vanhoof et al., 2013).



We have to take into account here that the context of Vanhoof et al. (2013) is the Flemish School Feedback Project. In this project schools received an individualized report with the results aggregated to school level. The first step as mentioned by Vanhoof et al (2013) is then *receiving data*. But in many cases, schools themselves are responsible for the generation of the data and even before that, for the reframing of the problems in order to generate data.

Each step requires specific data-use competencies. In the School Feedback Project, the competencies were described as follows:

- Being conscious of possible uses of data
- Being able to describe the central data concepts in their own words
- Being able to interpret the figures and tables correctly
- Being able to establish the strengths and weaknesses of their own school, as these appear from the report
- Being able to integrate this information into other data sources
- Being able to provide explanations for their own strengths and weaknesses
- Being able to undertake quality assurance initiatives or improvement actions based on these explanations
- Being able to set up and implement improvement actions
- Evaluation of improvement actions

As said before, effective leadership asks that the school leader put the process of generating and using data in a process of organizational learning in order to help the teachers to learn about data. In the

literature we found several examples of this emphasis on organizational learning, related to the use of data.

Wayman, Brewer, and Stringfield (2009) identify the following four main dimensions of successful leadership practice in using data:

- *Provide formal and informal structures to support data use; for example:*
 - At the district level, formal structures include technology, instructional vision, curriculum and school improvement and alignment.
 - At the school level, formal structures include centring data initiatives on specific measurable goals, building data structures from already-existing structures and new structures such as building capacity for triangulation of data.
 - Informal structures include encouraging collaborative work and using data in a non-threatening way.
- *Focus conversations on instructional improvement; for example:*
 - Engage in early conversations prior to implementation of a data initiative.
 - Centre open-to-learning conversations on instruction and practice.
 - Foster collaborative conversations that inspire teacher leadership.
- *Implement data initiatives purposefully so that:*
 - Teachers see the connection between data use and instruction.
 - Infrastructures support data use both in terms of available hardware and data.
 - Professional development integrates existing learning opportunities and offers many different times and ways for staff to learn the data system.
- *Make time to:*
 - Align goals of data with district instructional goals.
 - Offer professional learning that is tailored to teachers' personal contexts.

Copland et al. (2009) point to leadership activities that bring systematic information into consideration by leaders and others.

- *Building Organizational Cultures that Enable and Motivate:* leaders have taken deliberate steps to build a culture that supports inquiry into the pressing problems facing the organization. A central part of the culture of inquiry is that it characterizes the organization, not just a few key players; many players are participants in it, often implying that data-informed leadership is distributed, as are other aspects of the exercise of leadership.

- *Engaging in Cycles of Data-Informed Inquiry and Action.* At least five discrete phases of activity define this kind of “inquiry in action,” work that connects data to learning improvement:
 - *Focusing and reframing problems for inquiry.*
 - *Accessing or searching for data and evidence.*
 - *Intentional invitation of alternative (or contrary) perspectives.*
 - *Making sense of data and implications for action.*
 - *Taking action and communicating it in different arenas of data use.*
 - *Learning from action through feedback and further inquiry.*

7.1 Consequences for the professional development of school leaders

To start with, the concept of *data-informed educational leadership* (Copland et al. ,2009) teaches us the broad range of actions school leaders undertake in using data. In the professional development of school leaders it is obvious that school leaders are informed about this broad range of activities, how data is used and the kind of data that is implied. At the same time these leadership activities can serve as examples in the professional development of school leaders.

In the second place, is it necessary to describe not only the practices but also and foremost the corresponding competencies of effective data use by school leaders. Developing the curriculum for a training program for school leaders focused on data-informed school development requires a set of competencies that guide the program.

Before we build out of the different but overlapping descriptions of data-literate competencies into a framework that will guide the content of the curriculum, we make some observations. First, we recall the general aim of the project: to develop school leadership capacity for evidence-informed school improvement. The specific objectives of the project are: (1) to develop a curriculum for a training program for school leaders focused on data-informed school development and (2) to develop a strategy by which to implement the above mentioned program into the training of school leaders. In other words, the curriculum to be developed is aimed at being part of a more comprehensive training program for school leaders. As a consequence, not all competencies necessary for school leaders will be addressed in this curriculum. We restrict ourselves to those competencies that are more directly connected to the collecting, analysing, making sense of data and use it to plan actions. For example, a competency like thinking strategically, building and communicating a coherent vision in a range of compelling ways (OLS, 2011) will not be addressed in a direct way in the curriculum. The same goes

for a competency such as building a professional learning community (OLS, 2011). Even when we emphasize the process of organizational learning in using data, the realization of such a competency goes beyond the possibilities we have, as far as we are restricted to developing a part of the curriculum. That does not exclude, however, the notion that (a) in the formulation of competencies we emphasize the process of organizational learning about data use and (b) that the training school leaders to become data literate goes hand in hand with the application of methods of organizational learning. For example, a competency such as the ability to read, understand and interpret data can be reformulated as being able to help staff to read, understand and interpret data. And to develop this competency, applying a process of organizational learning between the school leaders in the course is both possible and desirable.

Second – following Vanhoof *et al.* (2010) and Copland *et al.* (2009) – we organise the competencies addressed in the curriculum according to stages of evidence-informed practice. This gives at the same time a framework for the subsequent steps in an evidence-informed practice and the possibility to describe the specific competencies necessary in these different steps.

One can identify some differences but also some overlapping between the descriptions of stages as presented by Vanhoof *et al.* (2010) and by Copland *et al.* (2009). Combining these two approaches we reach the stages of evidence-informed practice and the corresponding competencies and illustrations of skills, knowledge and attitudes, as described in table 3.

Table 3: Stages of evidence-informed practice, sample competencies and samples of skills, knowledge and attitudes

STAGES OF EVIDENCE-IN-FORMED PRACTICE	SAMPLE COMPETENCIES	SAMPLE SKILLS, KNOWLEDGE & ATTITUDES
<i>Focusing and reframing problems for inquiry</i>	Being able to help staff to define information needs	<ul style="list-style-type: none"> • Being willing and skilled to reframe problems from multiple vantage points • Being willing and skilled to help staff to reframe problems from multiple vantage points • Being knowledgeable about school self evaluation
<i>Accessing or searching for data and evidence.</i>	Being able to help staff to commission research	<ul style="list-style-type: none"> • Being conscious of possible uses of data • Be aware of needing different data for different purposes • Being knowledgeable about tools for data collection and analysis • Being willing and skilled to help staff to become conscious of possible uses of data, to become aware of needing different data for different purposes and to become g knowledgeable about tools for data collection and analysis •
<i>Invitation to discussion of alternative (or contrary) perspectives</i>	<p>Being able to initiate dialogues in the school in order to make sense of data together</p> <p>Being able to help staff to integrate this information into other data sources.</p>	<ul style="list-style-type: none"> • Reserving judgment • Having a tolerance for ambiguity • Valuing and promoting deep understanding • Engaging others (teachers, critical friends) in a professional dialogue around the data • Taking a range of perspectives and systematically posing increasingly focused questions • Recognizing other kinds of data (not only numbers, but also opinions, anecdotes, observations) • Being willing and skilled to help staff to develop an attitude of critical thinking (reserving judgment, tolerance for ambiguity, valuing deep understanding) • Being willing and skilled to help staff to recognize other kinds of data

<i>Interpretation of the data</i>	<p>Being able to help staff to read, understand and interpret data</p> <p>Being able to help staff to describe the central data concepts</p>	<ul style="list-style-type: none"> • Recognizing sound and unsound data • Being knowledgeable about statistical and measurement concepts • Being willing and able to make collective sense of the data • Being willing and skilled to help staff to recognize sound and unsound data
<i>Diagnosis of the problem</i>	<p>Being able to help staff to provide explanations of the strengths and weaknesses of their own school, as these appear from the data</p>	<ul style="list-style-type: none"> • Being knowledgeable about curriculum, teaching and learning problems • Being knowledgeable about school development and organizational learning problems • Being willing and skilled to help staff to become knowledgeable about curriculum, teaching and learning problems and about school development and organizational learning problems
<i>Planning: implication for actions</i>	<p>Being able to help staff to plan quality assurance initiatives or improvement actions based on these explanations</p>	<ul style="list-style-type: none"> • Being knowledgeable about how to improve curriculum, teaching and learning • Being knowledgeable about how to improve school development and organizational learning • Being willing and skilled to help staff to become knowledgeable about how to improve curriculum, teaching and learning and about how to improve school development and organizational learning.

8 Conditions for data-wise leadership

Data-wise leadership asks for some organizational conditions, in order to promote effective use of data.

Eraut (2004) mentions three conditions, particularly relevant to engaging in evidence-based practice:

- Practitioners must have quick and easy access to substantial amounts of information.
- Professions must facilitate relevant research and practitioners must integrate research outcomes into practice.
- Practitioners must use modern technology to access and apply data.

Copland et al. (2009) point to an infrastructure that supports and cultivates data-informed leadership for school improvement. With a focus on school and district leaders, the role of the school district is particularly important. District infrastructures that support data-informed leadership include:

- Offering sources of data or help with assembling or interpreting data (which may involve responding to school needs for particular kinds of information, etc.).
- Embedding new technologies that assist with data collection and interpretation (such as computer-based attendance, discipline records, or grading systems that enable access and make analysis more efficient).
- Creating occasions for inquiry (as when an influx of new immigrant children raises questions about appropriate educational programs or school assignments).
- Setting expectations for reliance on data in school planning and decision-making (as in mandates for the inclusion of certain kinds of evidence in the School Improvement Plan).
- Creating accountability structures for data-informed leadership linked to overarching district initiatives (such as expectations that principals engage in learning walks in classrooms to observe particular content areas that are the focus of district curriculum work, etc.).

Vanhoof et al (2013) describe different types of support, used in the so-called School Feedback Project: help desk; INSET (external training) by researchers; ONSET (internal training) by researchers; ONSET (internal training) by a pedagogical advisor and peer consultation. None of the support initiatives independently comprised all support characteristics that are required to foster effective use of data.

Because different types of support have different advantages and disadvantages related to some characteristics (i.e. interpretation oriented vs. use oriented focus), a combined support trajectory might be beneficial. A combined support route of this kind would consist, for example, in the availability of a help desk, an introductory external interpretation-oriented training session conducted by researchers, followed by an internal use-oriented training session conducted by a pedagogical advisor and peer consultation.

8.1 Consequences for the professional development of school leaders

It appears necessary that school leaders who will be trained to become data-wise leaders must be informed about the organizational conditions informing the use of data. Although here the district (leaders) play an important role, school leaders can influence the district leaders to realize the necessary conditions.

9 Goals and methods of professional development of school leaders

The above-mentioned capacities are very important for school leaders in our data-rich societies. But it is not easy to develop these capacities. This brings us to the topic of professional development of school leaders.

A lot of data exists in most schools: about student results, relations with parents, teacher satisfaction and so on. Nevertheless, it does not mean automatically that school leaders and teachers use this data to improve student results and school development. The results of data use are generally still somewhat limited (Schildkamp *et al.* 2009). There is also a lot of research (material) on effective education. It is not clear to which degree teachers are using this data and research. Levin (2010) mentioned different studies, showing a rather large proportion of educators who read and use research data. But he also noted that in these studies – mainly based on self-report – there is an overestimating of actual research use compared with behavioural measures. According to Hattie (2009), we have a rich educational research base but rarely is it used by teachers (and rarely does it lead to policy changes that affect the nature of teaching). The lack of knowledge and skills in working with data is currently a major obstacle (Earl and Fullan 2003 ; Kerr *et al.* 2006). Principals usually receive little or no training in

the field of conducting research, data collection, data management or data interpretation. Many principals themselves claim they do not have the necessary prior knowledge in order to be able to understand data correctly. According to Vanhoof et al. (2013), it is no surprise therefore, that research findings indicate that school principals (and teachers) state that they need support with both the interpretation and with the further use of data (see also Schildkamp et al. 2009).

Where principals do not make data use a priority, mobilize expertise to support data use, and create working conditions to facilitate data use in instructional decision-making contexts, teachers are not doing it on their own (Anderson et al., 2010).

Louis et al. (2010; see also OLS, 2011) investigated the ways principals and teachers use data, how the district influences data-informed decision-making by principals, and how student achievement is related to data use at the school level. They found that the principal plays a key role in establishing the purpose of – and expectations surrounding – data use, and provides planned opportunities and time for working with data. This includes professional learning, opportunities to work through collegial groups, and access to expert knowledge.

Evidence also suggests that teachers will embrace a data initiative when it is well implemented, relevant to the learning needs of students, and useful in informing teaching practice – further supporting the argument that school leadership is a key success factor in using data effectively.

Informed professionalism asks leaders to become data-wise (Earl & Katz, 2006; Earl & Timperley, 2009). An OECD study (Pont, Nusche and Moorman, 2008) emphasizes the value of accountability systems, but warns that those systems only lead to improvement if there is ‘data-wise leadership’.

So the need for training school leaders that would be focused this way is evident. In some training programs (but not all) one pays some attention to developing inquiry skills and to developing a culture of inquiry. But in most cases there is a lack of focus on generating data and to using it in the context of accountability and school development. We illustrate this by presenting the state of the art in the countries involved in this project.

In **Slovenia**, schools are relatively autonomous, with a strong focus on accountability of the school leader. Obviously, school heads in general lack the competence to make use of existing data. None of the modules in the obligatory headship license program is specifically focused on data-informed practice. In the **Czech Republic** the quality of school leaders working with data effectively has been recognized as a strong precondition for successful work (see the Long-Term Development Plan of Education System, 2007). Although schools in **Flanders** have no tradition of data driving decision-making, several governmental initiatives are changing this situation. The educational policy paper “*Education and*

training 2005-2006” introduced the concept of “an information rich environment for schools”. The decree on equal educational opportunities obliged local education bodies to execute “environment analysis”. Also, since 2010 schools also have access to relevant, reliable and valid indicators about school careers, achievements and learning gains. The Sustainable Development Strategy of **Latvia** (through 2030) (approved by the Latvian Parliament in 2010), stated that quality of education in developing human capital poses a great challenge for the coming years. Quality of education is closely linked with data interpretation. In this process school leadership teams played the main role. Recently, data-wise leadership has become the subject of discussion as a result of school ratings published in Latvia. In **Sweden**, the head teacher is, among other things, responsible for the results achieved by the school and for follow-up and evaluation in relation to national objectives. In general, school heads lack the competence to making use of existing data. In one of the three modules of the new obligatory academic national school leader in-service training program (2009), there is an emphasis on knowledge and skills for analysis and assessing data, processes and the results of their own schools, and on communicating results as the basis for further development.

9.1 Scepticism about and problems with data

Accountability, now at the centre of policy in many countries, forces school leaders to respond to stakeholders and to prove they are effective and responsible working with data. They are expected to become data-driven (Earl & Katz, 2006). But that does not mean that this happens easily. Some authors have pointed to the great confidence educators have in their so-called tacit knowledge and in the importance of this type of knowledge for the actions teachers undertake (Argyris & Schön, 1996; Connelly & Clandini, 1999).

In the literature we found several reactions of school leaders related to the use of data.

(Earl & Katz, 2006; Kowalski, 2009; Geysel et al., 2010, Vanhoof et al., 2010). Kowalski, 2009 points to three basic barriers to evidence-based practice in education. There is a lack of understanding evidence-based practice due to limited or narrowly defined views on research.

Many school leaders lack a clear view of how data feedback could be used for school improvement and they differ widely in their attitudes towards data (Earl & Fullan, 2003; Saunders, 2000). Even when evidence-based education is understood, there can be barriers to accepting it. Educators have not been held accountable for *what* should be done to improve education; they are socialized in *how* something should be done. As a result, their socialization has encouraged them to avoid failure and

innovation. Also educators are sometimes suspicious about possible political motives. In a study on the role of researchers and school leaders in supporting school improvement through data feedback in the context of more responsive forms of accountability in the Netherlands, one found that some principals and teachers are afraid of evaluation. Evaluation, though pervasive in schools, largely concerns students – not the educators. The historical conditions conspire to create a performance-oriented rather than a learning-oriented culture among educators. Principals can be somewhat anxious, since data can represent an evaluation of school leader practices (Geysel et al., 2010). There can be also problems in implementing evidence-informed practice, due to the lack of abilities or resources.

9.2 Effective professional development

Earl and Katz (2010) draw support for their model of “collaborative inquiry” from the research of Timperley, Wilson, Barrar, and Fung (2007) whose best evidence synthesis, they say, provides a backdrop for thinking about the way teachers and leaders can use data.

Timperley et al. (2007; see also Timperley, 2008; Robinson & Timperley, 2007; Robinson, 2007; see also Denis & Van Damme, 2010) put together – in an extended review of more than 100 studies – the most important findings about effective teacher professional learning and development. Teachers (and school leaders), as all adult learners, do not approach learning situations as empty vessels. They have ideas about what and how students learn and have to learn, and about what and how to teach. These – mostly implicit – theories of action of teachers have a powerful effect on the learning of teachers. New information that is inconsistent or in conflict with a school leader’s or teacher’s existing position can easily be rejected. So it is important to pay attention to ideas school leaders have about the use of data. Timperley et al. (2007) make a distinction between four professional learning processes, each with specific outcomes:

- Cueing and retrieving prior knowledge with the associated outcome of consolidating and/or examining prior knowledge.
- Becoming aware of new information and skills resulting in adapting or adopting new knowledge. This process may occur at a superficial or a deeper level of learning.
- Creating dissonance with a teacher’s current position. The associated outcome of this process is the resolving of the dissonance by accepting or rejecting the new position.
- Co- and self-regulatory learning processes. These processes imply that teachers, in repeated cycles, collectively and individually identify important issues, become the drivers for acquiring

the knowledge they need to solve them, monitor the impact of their actions, and adjust their practice accordingly.

These four processes are not mutually exclusive but rather iterative. Effective professional learning implies teachers making sense of professional development messages. Making sense is not simply a matter of making these messages clear to teachers or to leaving teachers to make their own professional judgments without first having had their theories challenged. Making sense is a complex process involving interaction between a teacher's existing position – the situation in which he practices – and the professional development messages. Deeper learning typically requires repeated cycles of engagement with learning processes, practices, and outcomes.

9.3 Effective professional development of school leaders

Smylie & Bennet (2005; see also Murphy, 2002; Young, Petersen & Short 2002; Heck, 2003 Darling-Hammond et al., 2007) note that we know very little about developing school leaders and that we face the problem of school leader development with remarkably little empirical evidence to guide us. Educational leadership development is a complex process. It asks not only for knowledge of effective leadership practices, but also for knowledge of the capacities necessary for those practices, for knowledge about the psychological and social processes that bring these capacities into development, and for knowledge about the learning strategies and sources that influence these processes. We know a lot about the effective practices, but very little about the other elements.

Based on scarce research (Verbiest et al, 2000; Darling-Hammond et al., 2007) we can conclude, firstly, that it is possible to create pre- and in-service programs that develop principals who can engage successfully in many of the practices associated with school success: cultivating a shared vision and practices, leading instructional improvement, developing organizational capacity, and managing change. Second, exemplary pre- and in-service development programs share common features:

- A comprehensive and coherent curriculum aligned to state and professional standards, which emphasises instructional leadership.
- A program philosophy and curriculum that emphasises leadership of instruction and school improvement.
- Lectures and reading of articles and books that offer conceptual frameworks for interpret experiences and for formulating goals to act on.

- Active, student-centred instruction employing pedagogical approaches that facilitate the integration of theory and practice and stimulate reflection, such as problem-based learning; action research; field-based projects; journal writing; and portfolios that feature substantial use of feedback and on-going self-, peer- and faculty assessment. Interactive working methods (training, intervention?)[interaction?], working in small groups) offering opportunities to learn from each other, and all related to real school contexts and real problems.
- Application of new knowledge and skills in the real context of the school, leading to insights and improving skills.
- Faculty who are knowledgeable in their subject area, including practitioners who have had experience in school administration.
- Social and professional support in the form of a cohort structure as well as formalized mentoring and advice from expert principals.
- Vigorous, carefully targeted recruitment and selection processes that proactively bring expert teachers with potential for leadership into the principalship.
- Well-designed and supervised administrative internships that provide opportunities for candidates to engage in leadership responsibilities for substantial periods of time under the tutelage of expert veterans.

Additional characteristics for in-service programs include:

- A learning continuum operating systematically from pre-service preparation through induction and throughout the career, involving mature and retired principals in mentoring others.
- Leadership learning grounded in practice, including analyses of classroom practice, supervision, and professional development using on-the-job observations connected to readings and discussions organized around a model of leadership.
- Collegial learning networks, such as principals' networks, study groups, and mentoring or peer coaching, that offer communities of practice and sources of on-going support for problem solving.

We conclude that professional development of (future) school leaders can be characterized by three core concepts (Vandenberghe, 2008; see also Kelchtermans, 1994; Ballet, 2000; Verbiest, 2009). To start with, professional development of school leaders is constructive. School leaders play an active-constructive role in given meaning to experiences in work and development. Secondly, professional

development is also contextually determined. Experiences receive meaning in a specific context, influenced for example, by policy context, work context and the context of professional development. Thirdly, professional development of school leaders is interactive. Thinking and action of school leaders take place in interaction with the socio-cultural environment of colleagues, staff, fellow students, and their opinions on e.g. good school leadership. Levin (2010) too stresses this type of professional development, offering that behaviour is rooted in social settings, which means that the primary determinants of professional behaviour are related to what colleagues and superiors do and value. The social nature of belief and behaviour presents both an obstacle to and opportunity for greater mobilization of knowledge, because it draws our attention to the importance of organizational attributes as key determinants of how research is used, and these attributes are amenable to change through the actions of educational leaders.

9.4 Consequences for the professional development of school leaders

The need to train school leaders to become data literate is beyond doubt. Principals play a key role in data use but they usually receive little or no training in using data collection and find themselves ill equipped in terms of knowledge and skills.

Although we know very little about developing school leaders, there are some principles that prove valuable in the professional development of school leaders, most important among them:

- A comprehensive and coherent curriculum aligned to state and professional standards, which emphasises instructional leadership and school improvement.
- Lectures and reading of articles and books, offering conceptual frameworks for the interpretation of experiences and to formulate goals on which to act.
- Active, student-centred instruction employing pedagogies that facilitate the integration of theory and practice and stimulate reflection.
- Leadership learning grounded in practice, including analyses of classroom practice, supervision, and professional development using on-the-job observations connected to readings and discussions and organized around a model of leadership.
- Collegial learning networks, such as principals' networks, study groups, and mentoring or peer coaching, that offer communities of practice and sources of on-going support for problem solving.

- [THIS SECTION ABOVE REDUNDANT – APPEARS ON PREVIOUS PAGE(S)]

It is also important to take into account the specific characteristics of the learning professional. Professionals bring to the learning process their own experiences and views on the use of data (see for examples the remarks about ‘scepticism about and problems with data’. It is necessary to pay attention to these existing views, to explore these views and – if necessary – to create and solve the conflict between existing and new insights. Furthermore, it is important to organise processes in which school leaders can refine their practice of data use.

These didactic approaches go hand in hand with the already-mentioned emphasis on an organizational learning approach.

10 Summary

In this last section we summarize the most important guidelines for the development of the curriculum, based on the consequences for the professional development of school leaders we have formulated at the end of each section.

We start with (1) guidelines concerning the didactical approach. Then we formulate some guidelines related to the competencies (2), and the more specific knowledge (3) required by school leaders to become data literate.

1. Professional development of school leaders to become data literate requires
 - a. an organizational learning approach, in which a group of students can, in an active and reflective way, explore their views on data use in schools, evaluate them in the light of new information about data use, and formulate new goals and activities related to data use in their own school.
 - b. lectures and reading of articles and books offering conceptual frameworks within which to interpret experiences and formulate goals on which to act.
 - c. practices in their own school (with feedback from peers or tutors) in order to refine the competencies of a data literate school leader.
2. Professional development of school leaders to become data literate is based on a set of competencies:
 - a. The competencies themselves are described in table xx
 - b. Due to the emphasis on improving student results and on the improvement of school or-

ganization, the competencies are focused on the role of the school leader to put the process of generating and using data in a process of organizational learning, in order to help teachers learn about data. This implies that

- c. The competencies are restricted to those competencies that are more directly connected to the collecting, analysing, and making sense of the data and it to plan actions.
 - d. The competencies are organised according to stages of evidence-informed practice.
3. Professional development of school leaders to become data literate requires specific information (see also 1.b.):
- a. School leaders have to critically judge policies on the use of data in schools and education like the data-driven movement. This requires critical reflection on information regarding the policy context of accountability and a focus on learner results; critical reactions to this policy; recognising the distinction between an external accountability perspective and an internal development perspective, the distinction between and interdependency of data for improving *student results* or for *developing the school*; the necessity of intelligent accountability systems, including broad self-evaluation; the importance and relevance of data in developing student learning, the development of the school, and the importance of engaging staff in using data for purposes of improvement, with an emphasis on the developmental approach.
 - b. School leaders have to understand the terminological and conceptual distinctions between data, information, knowledge; and the conceptual consequences of evidence-based and evidence-informed practices.
 - c. School leaders need to be able to reflect critically on the data and, consequently, distinguish between different types and sources of data, and judge the validity and reliability of the data.
 - d. School leaders need an overview of the most important data available and where it can be found or generated. This implies that school leaders have at their disposal a framework that connects the school organization to classroom instruction and to the results of students, in order to make informed decisions on the generation of data, taking into consideration the important variables of classroom instruction and school organization.
 - e. School leaders must be informed about the organizational conditions for the use of data.

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