6 South Africa[1]

Approaches to effective data use: Does one size fit all?

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One morning, Pieter, Rajesh and Sibongile, three principals in different schools in Gauteng, South Africa, sit in their respective offices looking at the report from the learner performance feedback system that their Grade 1 (six or seven-year old) learners are participating in. Although the reports are in the same format and their schools are all participating in the same provincial education system in South Africa, their educational experience and that of their learners is very different. Nonetheless, all three principals, share the belief that the data on their learners phonics, reading and mathematics skills are essential in improving the teaching and learning taking place in their schools. All three also have a keen awareness of the unique needs and contexts of their school and teachers and a leadership philosophy that they have found works for them in their school. Pieter is very person-orientated in his leadership, he is aware that his teachers do not have a natural preference for working with data and takes a hands-on approach in leading the team of teachers in meetings and planning to use the data. Rajesh has established a strong culture of professional development in his school and sees the data use not only as an opportunity to directly improve teaching and learning, but also as an opportunity for his head of department to develop her data-literacy and facilitation skills. He sits with her to discuss the report and then allows her to guide the process further, working with the teachers in a group or individually. Sibongile is conscious that her teachers did not have the best of pre-service teacher training. While her teachers appear to realize how valuable data can be and they are always interested in seeing how well their school has achieved, they are often uncomfortable with looking at graphs and numbers. She interprets the data from the report and provides it to the teachers as she feels necessary, helping them plan accordingly and popping in to classes to see how the plans are being realized. In all three these cases the data from the feedback system took very different paths once it entered the three schools, but in all three schools it was clear that the data were used to improve teaching and learning.

This chapter looks at how three very different schools use their school's data from the South African Monitoring system for Primary schools (SAMP) feedback system to improve how their schools provide education. SAMP was developed as a collaboration between participating schools and university researchers and has been in use since 2002. SAMP is currently used in 22 schools in the Tshwane area in South Africa and is administered in three languages Afrikaans, English and Sepedi. Pieter's, Rajesh's and Sibongile's schools were selected as their schools used the data to improve teaching and learning and their learners showed strong gains throughout the first year of schooling. It is hoped that a deeper understanding of how data move in schools (data paths) and how schools can appropriately

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use data may assist policy makers in developing monitoring policies that can be successfully implemented to attain quality education. The cases may also provide guidance to school leaders and teachers on the multiple ways in which data may be used effectively to develop data paths befitting their own context and school culture.

6.1 INTRODUCTION: CONTEXT

Education systems are not only complex in themselves, but are also embedded in a political, cultural and economic context (UNICEF, 2000). This is very evident in South Africa where there are many challenges to the provision of quality education (often vestiges of the apartheid era). Many schools remain under-resourced, with inadequate infrastructure and large class sizes. There is a substantial teacher shortage in particular subjects and phases such as mathematics, science (Howie, 2010), African languages and the Foundation Phase (junior primary school phase, the first three years of schooling) and the educational workforce includes many poorly trained teachers (Department of Education, 2006c). During the apartheid era, education was utilized to socialize children into their expected societal roles according to race (Department of Education, 2002). The resulting segregation by race, geography and ideology led to the establishment of 19 different education departments which in turn, reinforced the inequalities of that society through their curricula (Department of Education, 2002). The ensuing inequality was considerable, with the government spending up to nine times more on each white pupil than on a pupil from Bantustans (apartheid era political homelands set up for Black Africans) Education (Department of Education, 2002).

Significant changes have taken place in the South African landscape since the fall of apartheid in 1994. The 19 different education departments have subsequently been unified under one Department of Education (DoE) (now the Department of Basic Education). Although the first few years of education are available in all 11 official languages, in practice learner access to education in their home language is only afforded to approximately 60% of South African children (Howie et al, 2008). Formal schooling in South Africa begins with a reception year Grade R and followed by Grade 1 to Grade 12 with learners entering Grade1 in the year they turn seven years of age. The first four years of schooling in South Africa (Grade R-3) is known as the Foundation Phase and aims at establish basic skills, with the primary emphasis on literacy and numeracy, so that learners can learn and work more independently in the later phases.

This unification and restructuring of education in South Africa, along with various other curriculum reforms has endeavored to provide access (largely achieved with an 89% Net enrolment at the primary level) (World Bank, 2008) equality in education (some progress made) as well as improve its quality (little progress made). A quintile system was also introduced to differentiate funding from the DoE in order to redress past inequalities. The quintile system is used to allocate funds differentially to schools in order to redress the large difference between schools (Van den Berg & Burger, 2002). Quintiles for each province are determined based on rates of income, unemployment and illiteracy in the school catchment area. This system has not been without its problems, as parents from

impoverished areas have moved their children to schools to wealthier areas thus defeating the intentions behind the government funding model. This has led to the changed composition of learners in schools in largely urban areas of South Africa and former white, coloured and Indian schools becoming integrated and the former African schools in rural areas and townships remaining African in composition.

Therefore, although there has been many improvements, particularly in terms of access to education in South Africa, the challenge of improving the quality of that education to equip pupils to redress their disadvantaged backgrounds remains (Naker, 2007). The challenge of improving the quality of education is clearly seen in pupils' performances in key subjects such as reading, mathematics and science as evinced in international studies where South African pupils attained the lowest scores internationally in the Trends in Mathematics and Science studies (1995-2003) and in Progress in International Reading Literacy Study 2006 at both primary and secondary levels. The low achievement has been confirmed in national and provincial systemic evaluations (Department of Education, 2006a, 2006b; Howie, 2008; Howie et al, 2008; Martin, Mullis, Gonzalez, & Chrostowski, 2004).

The South Africa Revised National Curriculum statement (Department of Education, 2002) embraces assessment not only for monitoring and reporting, but also as a driving force for learning, with the ultimate aim of improving the quality of education. The South African government believes that data are essential to improve the quality of education and that these data should be generated through monitoring aspects such as learner performance, curriculum planning and teaching. Therefore, policies for monitoring such as the Integrated Quality Management System (IQMS) have been instituted (Education Labour Relations Council, 2003). The IQMS consists of three programs aimed at enhancing and monitoring performance of the education system. The three programs are: *Developmental Appraisal* to determine and address individual teachers' development needs, *Performance Management* for teacher progression and *Whole School Evaluation* to evaluate the overall effectiveness of a school as well as the quality of teaching and learning.

Additional pupil performance and monitoring data are generated through continuous assessment in the classrooms, systemic evaluations at Grade 3, 6 and 9 levels (Department of Education, 2006a, 2006b) and international comparative educational studies of the International Association for the Evaluation of Educational Achievement (IEA) and the Southern African Consortium for the Monitoring of Educational Quality (SACMEQ) (Howie, et al., 2008; Martin, et al., 2004). The mere existence of this data cannot lead to improvement of the quality of education in South Africa. For improvement, appropriate use of the data for decision-making and action is essential. The data therefore need to be fed back into the system, both at national and school level and used to inform decision-making and improvement strategies (Gawe & Heyns, 2004). While attempts have been made by the South African government to collect data for improvement purposes, there is little evidence of effective use of data by schools (Archer, 2010). This may in part be due to the data being reported at a high level of aggregation with not enough detail to meet the decision-making and planning needs of the varying school contexts.

In this chapter the issue of how data can be effectively used is examined by illustrating how three schools acted on data received during their participation in the South African Monitoring System for Primary schools (SAMP) project. The chap-

ter focuses on how data move within the school context and addressing the issue of facilitating appropriate, constructive use of pupils' performance data in schools.

6.2 DATA DISSEMINATION AND DATA USE: HOW THE ONE INFLUENCES THE OTHER

The ultimate purpose of use of performance data is to improve teaching and learning. According to Van Petegem and Vanhoof, (2005) there are four reasons to gather performance data: for information needs, for accountability purposes, to create marketing mechanisms or to stimulate discussions on quality in education in order to lead to improvement. Studies have also shown that programmes designed to strengthen the feedback that students receive about their learning results in considerable learning gains (Black and Wiliam, 1998a), especially if particular qualities of students and students' work and how the learner can improve are highlighted (Black & Wiliam, 1998b).

Data use for making informed decisions has increasingly become emphasized in education. Especially as data-driven decision making has been linked to improvements in learner performance (Campbell & Levin, 2009) and the active support of data use correlates well with use of performance data (Saunders, 1999). However, the drive for data-driven improvement makes it necessary to development coherent systems that allow schools to interpret and act upon information received on students (Halverson, 2010). These systems may be internal to the school or external, but in both cases focus on providing feedback on the learner performance data. Many authors (Kluger & Denisi, 1996; Hattie & Timperley 2007; Shute, 2008) agree that feedback is regarded as crucial to improving knowledge and skill acquisition.

The feedback of data for use can be viewed from a more systemic perspective where a system external to the school provides feedback, or internal to the school on a classroom-level where teachers provide feedback to students. In both cases the process of knowledge and skill acquisition is involved, principals and teachers make sense of data for improvement purposes and students making sense of communications regarding how they can improve their performance.

A number of concepts were introduced above which should be clarified: feedback, data and information. For the purposes of this chapter, feedback is seen as an action taken by an external agent to provide data on performance (Hattie & Timperley, 2007; Kluger & DeNisi, 1996). The data provided is intended to be used to modify thinking or behavior in order to improve teaching and learning. A piece of datum which is not known to the receiver before receiving it becomes information at the moment it is received (Kamel, Narasipuram, Toraskar, 1997). In other words, when data are interpreted then it becomes information as the meaning, relevance and purpose has been provided by the receiver (Schildkamp & Kuiper, 2010). Furthermore, data are seldom used in the form in which it is presented but requires interpretation on the part of the receiver and it is very often the interpretation which is used.

The fact remains that schools are measured by the outcomes they achieve which results in the generation of data but this data has to be converted into useable information (The Urban Institute, 2004). Harris, Chapman, Muijs, Russ and

Stoll (2006) argue that when schools make use of data to drive change coupled with extensive professional development then an increase in performance can be achieved. This is corroborated by Cradler (2008) who argues that when data are used to inform decision making regarding instructional planning the probability to attain desired outcomes increases substantially. However, as Earl and Katz (2006) state the "interpretation and application of data by teachers, and by the public, are woefully inadequate and sometimes very wrong" (p. 18). So while teaching and learning should be an interactive process and schools need to know how their learners are progressing and the difficulties that are experienced with regard to learning (Black & Wiliam, 1998a) a gap often exists between the existence of data and the use of data (Earl & Katz, 2006). This is very often compounded by the way in which data are employed and moves throughout the school system once the data are received (Archer, 2010).

The routes the data travels in the schools is known as data paths and are also influenced by the culture[2] of participating schools and leadership styles of the principals and head of departments (HoDs). As stated by Salpeter (2004), "[t]he most important element of an effective data-driven program is not the data-driven program, is not the data, the analytical tools, or even the curriculum framework…it is the school culture in which the data inquiry takes place".

The term data path originated in the field of information technology and refers to how a collection of functional units perform data processing operations. The purpose of a data path is to provide routes for data to travel between units (Mano & Kime, 2004). This same concept is applied here, with the functional units represented by the principals, head of departments, teachers and other staff in the school who are included in the school decision-making processes utilizing the data from the feedback systems. It is not just who is included in the data processing and decision making process which is important, but also the roles of the various participants as well as who is excluded from the process. It is thus important to make a systematic effort to facilitate the flow of data to lead to appropriate and effective use of the data for a particular school. This means that it is imperative to manage the data flow and not just the data, as has been witnessed in organizational environments (Krovi, Chandra & Rajagopalan, 2003). By mapping the data movement within the school environment the way in which data are transferred from one point to the next within the school is analyzed (Hibberd & Evatt, 2004). Knowledge of school data paths means that the feedback system can be developed to meet the needs of schools and the data paths usually employed, thus providing a better understanding of the school environment and a direct link with data stakeholders. The mapping provides understanding of how data are used and by whom

[2] The concept of culture as used here has many facets, it includes a certain cultural heritage associated with a specific language and racial group, the level of urbanization of staff, the sense of school culture, specifically the spirit of collaboration, approach to shared learning and a drive for improvement. It also encapsulates the values and norms seen as part of the school culture. All of these factors may have an influence on whether or not data are seen as important and valuable in school improvement. These factors may influence both the likelihood that data will be used as well as the approach to data use that will be employed. For instance in a culture that highly values communal processes, a team approach may be employed to work with data while in another culture data may be seen as the domain of those in leadership positions and therefore would not be interrogated and interacted with independently by staff members.

which means that the way in which information is provided can be formulated in a manner that will facilitate a higher degree of use.

6.3 RESEARCH DESIGN AND METHODOLOGY

The overall SAMP research project aimed not only to generate knowledge, but also to design and develop a well-functioning feedback system to provide data to schools on learner performance. A design research approach was applied focusing on creating solutions for complex real-life problems within the specific context (De Villiers, 2005; Plomp, 2009; Van den Akker, 1999). The design research process is iterative and follows a cyclical pathway of development and evaluation (Nieveen, 1997; Richey, Klein, & Nelson, 1996; Thijs, 1999). This cyclical iterative analysis of design, development and implementation was combined with formative evaluation to understand issues concerning use of data. Each cycle of design research consisted of the introduction of a version or prototype of the feedback system that was evaluated by users and experts. The evaluation then informed further improvement of the feedback system in the form of the next prototype. Developing various prototypes was seen as generating "successive approximation of the ideal" (Van den Akker, 1999, p. 2). Although there were several design cycles in the overall optimization process for SAMP, this chapter focuses on the data generated through observations, journals and interviews in the evaluation of one of these design cycles. The evaluation data collected during this cycle of development focused particularly on how data was used by schools and how data moved within the schools, the focus of this chapter[3]. This section describes the SAMP feedback system which provided the data of which the use of was investigated as well as the methodology used in this design cycle to investigate school data use and data paths.

6.3.1 The feedback system

This section provides a short description of the feedback system. For more details, see Archer (2010). The South African Monitoring system for Primary schools (SAMP) is one of the monitoring and feedback systems of the Value-Added project initiated in 2002 by the Centre for Evaluation and Assessment (CEA) in collaboration with the Centre for Evaluation and Management (CEM) at the University of Durham in the United Kingdom (UK) The SAMP feedback system aims to provide learner performance monitoring data to schools to support schools in planning and improvement action at a grade and individual learner level. These data provide an indication of a child's readiness for academic learning and scores from the system correlate well with subsequent academic achievement (Tymms & Coe, 2003). The current SAMP feedback system provides the data and support for use of the data by combining a number of elements: written reports, manuals,

[3] For an in-depth discussion of the cycles of design, development, implementation and evaluation of the SAMP feedback prototypes see Archer (2010).

feedback sessions between the feedback system staff (at the university) and school personnel, an electronic resource and support website.

The Grade 1 learners (entry level, five to seven years) participate in two linked assessments one at the beginning of the year and one at the end of the first year of schooling. Learners are individually assessed in early phonics, early reading, early mathematics and handwriting. Each school receives a written report with pupil and school results after each assessment (baseline and follow-up). The follow-up report providing specific information on the gains made between the two assessments. Data are presented in table and graphic form along with in-text discussion. The report allows for a comparison of the school's results over two years (comparing this year's Grade1 learners performance with that of the previous year's cohort), as well as comparison with the average performance of the schools participating in SAMP. Every report concludes with a summary and list of selected activities that may be useful to address school-specific issues.

A manual to facilitate interpretation by the schools' staff members accompanies the report. The manual contains a description of the project and the various subtests and scales. The links between the curriculum and each subtest, as well as the underlying skills assessed in each subtest, are indicated to facilitate use of the data. The validity and reliability data for the instruments are discussed in a section on the quality of the instruments. The manual concludes with a section on how to interpret the data and make use of it in the schools.

A feedback session (led by the feedback system facilitator at the university) with the aim of helping schools interpret and use the data also takes place after each assessment where the project, reports and report interpretation are discussed. All Foundation Phase (Grade 1- Grade 3) teachers, Heads of Departments (HoDs) and principals are invited to the feedback sessions, which provide an opportunity for face-to-face communication with other schools and the monitoring team bi-annually. A presentation describes the project and then explains to participants how the data can be interpreted. Participants raise issues and share ideas for addressing problems in various school contexts and for improving the feedback system.

In addition, materials are provided to the schools in the form of an electronic resource as well as the SAMP resource website to support data use for decision-making, planning and action in the schools. The electronic resource takes the form of a CD or DVD and is given to each school. Each CD or DVD contains a database of free educational resources for classroom or home use. These resources vary from printable materials such as worksheets to educational presentations and electronic educational games. Each resource also contains electronic copies of the report and manual for the particular school and the school's data set to facilitate further analysis by the school. The website contains similar resources, but is updated regularly with additional materials.

6.3.2 Sample

The sample for this chapter consists of three schools out of the 22 schools participating in SAMP that were purposefully selected. The schools were identified by the researchers as actively engaging with the feedback system. This meant that

they had all attended the feedback sessions, received the reports and manual and had full access to the electronic resource and website. The three schools also showed good gains from the baseline to the follow-up assessments which they attributed to the use of the SAMP data. The three schools in these case studies had participated in the SAMP feedback system for at least two years.

The three schools were chosen from each of the English, Afrikaans and Sepedi language groups. Pieter's school represented the Afrikaans language group. Whilst the school has mainly White, Afrikaans first-language learners, it has just become a dual medium school presenting classes in English due to a growing population of Black, African learners, a phenomenon explained earlier in the chapter. The school has an intake of about 100 new Grade 1 students every year. English is the medium of instruction in Rajesh's school with the student population consisting mainly of Black, African second language learners with a wide variety of home languages. Annually about 150 learners enroll for Grade 1 at this school. At Sibongile's school the students mainly learn in their first language, Sepedi and all of the learners are Black, Africans. Some 140 learners start their first year of schooling here every year.

6.3.3 Instruments and data collection

The data collection for the cases involved three different data collection strategies with the data collected from each strategy informing and guiding the development of the following strategies. These included:

1. Non-participant observations (n=3 meetings, one per school): Participants, ranging from principals HoDs and teachers, were observed by the researcher during the meetings concerning the feedback data. Naturalistic observations[4] were conducted noting the groups' interaction and approach to working with the data. Meetings were digitally audio and video recorded and extensive field notes were taken.
2. Classroom journals (n=6 journals in total across the three schools): Teachers were requested to fill in a daily semi-structured journal over a four-week period about their use of the feedback in their school and class. Teachers were guided to record information relating to: the influence of the feedback on for instance the teacher's planning, practice, communication and individual pupil support, the accessibility and practicality of the feedback and barriers to using the feedback. Not all teachers decided to complete the journals, the journals that were completed were used in the analysis
3. Semi-structured interviews (n=5 interviews across the three schools): The semi-structured interviews were conducted with principals, HoDs and teachers. Principals were interviewed individually and the teachers and HoDs participated in group interviews. The interviews served to follow up on the observations and journals in order to gain further clarification. The semi-structured interviews focused on: the types of data and materials used in the feedback system; the

[4] Naturalistic observations are unstructured observations where the observer is a non-participant observer and tries to capture all that takes place in as natural as possible form by trying to minimize interference due to his or her presence.

types of use that takes place and the purpose thereof; procedures of data use in the schools (data path, different roles of staff, additional training and support); changes in the school attributable to use of the data; barriers to using the data and possible improvements in the feedback of the data.

6.3.4 Analysis

The data collected through these data collection strategies were thematically analyzed. Data were iteratively analyzed throughout the data collection process. Analysis informed development of later data collection strategies to clarify information received from earlier data processes (for instance the analysis of the observations facilitated the development of the classroom journals). This iterative data collection and analysis process resulted in a rich picture of data use in each of the schools.

All data were captured electronically and analyzed per meaningful unit of text. A meaningful unit could be represented by for instance a sentence or paragraph referring to the same aspect. Codes were generated through an inductive process and allocated to each unit of text. Once coding was completed, codes were clustered together in meaningful groups to generate themes. For example, the theme professional development includes codes such as *use to increase data literacy* and *use to identify training needs*. The computer-aided qualitative data analysis program Atlas.ti (v.6) facilitated the analysis process. While the study examined all aspects of use, this chapter focuses on the movement of the data throughout the schools in the form of the data paths and the types of data use that were seen in each of the schools studied. The grounded theory method analysis led to the generation of the three data paths discussed in the results section. The analysis of the of the types of use combined inductive and deductive method with different types of use explored inductively, to examine all use, but the naming of the types of use found was guided by the conventions in literature and particularly the purpose of uses as discussed by Schildkamp & Kuiper (2010).

6.4 RESULTS

In the following sections each of the three cases are introduced and discussed. Every case is firstly described in terms of the school environment then the data path for each school is analyzed. Finally, an analysis is undertaken per school in terms of the types of data use taking place in the school.

6.4.1 Pieter (School A/E)

Pieter had been with School A/E for a number of years and has witnessed some major changes in the challenges the school faced. When Pieter started at School

A/E most of the students were fairly poor, White, Afrikaans students from the area. Over the years, a number of Black, African pupils had moved into the area. In response to the change in demographics, the school switched from Afrikaans to dual medium with classes now being offered in either Afrikaans or English. The pupil population could still be considered as socio-economically poor, but little financial support was received from the Department of Education (DoE). As the school was located in an urbanized area with good infrastructure, the school was placed in a higher quintile[5], thus decreasing funding from the DoE. The teachers and staff expressed concern about the demands of maintaining discipline in the school which reduced time dedicated to tasks in the classes. Pieter could see that parent involvement in the school would be of great help, but had difficulty in increasing parent participation particular as many parents had a low level of education. In addition, many parents could not afford the school fees, which meant that Pieter often needed to look for alternative and additional funding for the school. Pieter was however quite positive as a number of the teachers were studying further at tertiary institutions. A major focus for the school was ensuring that the new English education component was functioning well.

Pieter was committed to a team approach in addressing school issues. He acknowledged the different strengths and weaknesses in staff members and encouraged them to familiarize themselves with their own personality profiles and problem-solving preferences during teamwork. Pieter felt very strongly that data-based decision-making and planning had to take place and emphasized that all data generated had to be interpreted and used appropriately.

6.4.1.1 Data path – Team Approach

Firstly, at least two Grade 1 teachers attended each SAMP feedback session, usually accompanied by the Pieter himself or the Foundation Phase HoD. Secondly, once the reports were received by the school, a meeting was scheduled with the Grade 1 teachers, HoD and principal. Thirdly, each group of attendees was tasked with different preparation aspects for the meeting. Teachers compared pupil results with their own assessment results and their list of pupils identified for the remedial program. In order to provide feedback to the pre-schools, the HoD was tasked with conducting a further analysis to determine how pupils' pre-school education was related to their performance. (Communicating with the pre-schools about the data on the Grade 1 performance was a priority determined by the school.) The principal collated school performance trend data based on all previous reports from the SAMP project.

During the meeting between the principal, HoD and teachers (see Fig. 6.1), the data were discussed and compared to other assessment data. Fourthly, tasks were allocated, measurable goals set for improvement and a date fixed for the next meeting to monitor progress. Fifthly, data were conveyed to other stakeholders. The principal undertook reporting the school's status and progress to the School

[5] Schools in South Africa are categorized into quintiles for each province based on rates of income, unemployment and illiteracy in catchment area. Quintile 1 represents the poorest schools, while quintile 5 represents the least poor schools. The quintile system is used to allocate funds differentially to schools in order to redress the large difference between schools (Van den Berg & Burger, 2002).

Governing Body (SGB). The data were also relayed to the School Based Support Team (SBST) to help with planning and support for pupils identified as being at risk in the feedback. Finally, follow up meetings were held to monitor progress and to provide opportunity for further planning. Between formal meetings, the HoD and teachers held informal discussions about progress of individual pupils, the planning and support for pupils identified as being at risk, the success of changes to the curriculum and classroom activities and support materials drawing on information given during feedback sessions and in the reports.

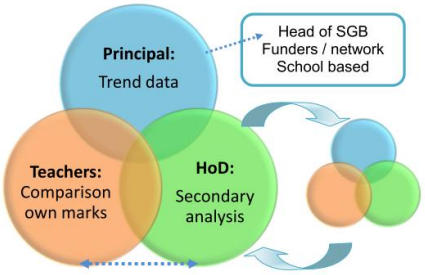

Fig. 6.1 School A/E data path: Team Approach

The type of data path observed in School A/E was labeled the ***Team Approach***. The principal viewed this group-based approach as the most appropriate for his school. "We [the team] have a meeting and we analyze the data, we work out an action plan and strategy...then we decide whose responsibility it is... what we can do to address the challenge...then we have follow-ups through-out the year." (Interview, Principal[6]) In this instance of the Team Approach, the group of teachers, HoD and Pieter met together about the data, each had certain follow-up data tasks allocated to them. Planning was conducted together in the group and monitoring of progress took place at formal group meetings where all were again present to evaluate progress, address new issues or adapt planning. The data were thus used consistently in a team format with several follow-up meetings to monitor implementation and conduct further planning. In this case the principal, Pieter was also involved in each step to ensure that appropriate data use was taking place.

6.4.1.2 Types of use

In School A/E the data were used to ***support conversations*** between the Grade 1 teachers about individual pupil results, the school curriculum and classroom approach "I was concerned about pupil X, he did well in your assessments, but struggled in class. So we all [Grade 1 teachers and HoD] sat together and made a plan" (Interview, Teacher 1). More formal discussions were held with pre-schools in the area to emphasize the type of school readiness skills (such as phonic awareness) that the pupils required prior to formal schooling. "This year we had a meeting with the church pre-school. We talked to them about the skills the Grade 1 pupils need for our school and gave them a whole list of tasks they [referring to

[6] The particular data collection method from which the data originated is indicated in brackets. In this case the quotation was taken from an interview with Pieter the principal.

pupils] should be able to fulfill" (Interview, HoD). Data from the follow-up assessment were also relayed to the Grade 2 teachers to highlight areas in which the Grade 1 pupils needed further support: "… if they [the children] can't do something, the Grade 2 teachers need to know where to start" (Interview, Teacher 2). The data were used to support requests to the SGB, DoE and potential funders for further resources: "… when I am asking for extra funds for a remedial teacher, occupational therapists, it is something to have in hand" (Interview, Principal). In addition, the data were used in parent meetings to support teacher evaluations and recommendations. The HoD suggested that the teachers use the data to encourage individual pupils' parents to become more involved particularly if their children were struggling with school work.

In Pieter's school the feedback data were triangulated with all other available assessment data, including evaluations from speech therapists and occupational therapists. The data were used to gauge if the assessment standard of the teachers was appropriate and to validate the teachers' identification of pupils who may possibly have failed. "I used the individual results today to see if I am marking too leniently" (Journal, Teacher 1).

Further analysis of the data as presented in the feedback reports was encouraged by Pieter in order to examine trends of school performance over a number of years and to provide feedback to pre-schools in the intake area of the school (Observation, agenda and meeting materials). The data were used for formal goal setting for individual pupils and the school. Measurable goals were set in terms of achieving gains as well as achieving a minimum final score. "We work for that 10% gain. It motivates us through the year" (Interview, HoD). The school was concerned with maintaining a high standard relative to other schools with similar characteristics in the sample. The principal was therefore able to ***monitor*** both the gains of pupils and performance of the teachers in achieving the goals set.

Furthermore, the principal and HoD discussed the results from the reports to establish the ***professional development needs*** of the teachers. For instance the new English teacher expressed concern about the learners' Vocabulary scores and her ability to enrich the vocabulary of second-language learners, Pieter thus arranged for her to attend a course in vocabulary stimulation. The data were also employed by the principal to meet the ***accountability demands*** to the School Governing Board (SGB) through feedback at the SGB meeting and the National Department of Basic Education (DBE) by incorporating the feedback reports into the Integrated Quality Management System (IQMS) as part of the school self-evaluation data. Through the teachers, HoD and School Based Support Team (SBST), the data were also directly used for ***curriculum development*** for the school's Grade R to Grade 2 classes (Observations, HoD, principal and teachers 1-3).

6.4.2 Rajesh (School E)

Rajesh had seen some changes in the pupils School E caters for over the previous few years. While School E was situated in an area with a pre-dominantly Indian population, a number of Black, African pupils started commuting to the school from the township areas. The language of learning and teaching in the school had always been English, but the majority of the pupils were now African and more

than a dozen home languages could be identified in the Grade 1 classes. Rajesh also noticed that parental involvement in the school became more limited as pupils mostly commuted to school.

Rajesh, the school principal was committed to the improvement and further education of his staff, with even the tea-lady being involved in tertiary studies. He not only encouraged staff to participate in the professional development program organized by the DoE, but also arranged for private training opportunities. Unfortunately this led to a high turnover rate of staff as the teachers were often head-hunted by more affluent schools after they had completed their additional training and studies.

At the time of the research, the Grade 1 teachers were using a program called 'Sheltered Instruction Observation Protocol' (SIOP) to focus on language development through all the learning areas. The introduction of this program was in response to the main challenge facing the school: most pupils were not first language English pupils. As Teacher 3 (Interview) explained: "You will find all 11 official languages in any class in the school and a few extra for a bonus".

6.4.2.1 Data path – Cascade Approach

Rajesh, as the principal, took a strong interest in the feedback from SAMP, but rarely attended the feedback sessions himself. Mostly all the Grade 1 teachers, the HoD and sometimes teachers from Grades R, 2 and 3 attended. A formal path for the data in the school was in place referred to here as the ***Cascade Approach*** (Fig. 6.2) as the data cascaded through the different levels of the school from the principal to the HoD and teachers and finally the deputy principal.

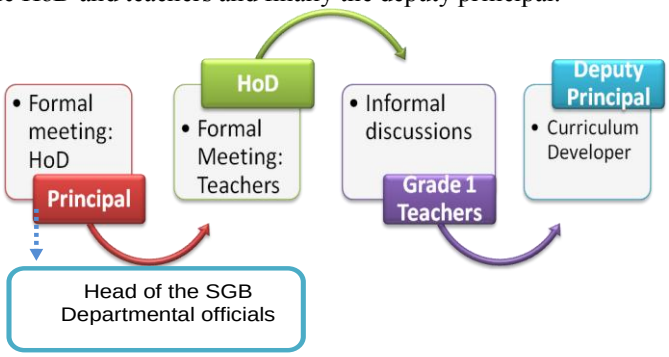

Fig. 6.2 School E data path: Cascade Approach

The first step in the approach was a meeting between the principal and HoD where feedback was discussed and areas of concern highlighted along with areas of strength and potential improvement. As the second step, the HoD presented the data at a formal meeting with all teachers from Grade R to Grade 3. The principal insisted on all the teachers being involved.

The third step involved the Grade 1 teachers continuing discussions, mostly informally, about individual pupils and changes to the curriculum. The teachers also focused on evaluating whether the new SIOP intervention was proving effective. The curriculum planning for the following year was aligned with the activities recommended in the feedback.

Finally, the data were kept in the deputy principal's office for teachers to access. The deputy principal was responsible for curriculum development and she would then integrate the recommendations into the curriculum planning for the following year. The principal (Interview) impressed upon his teachers the importance of working with the data, but did not take control of the process: "I don't get involved with the HoD's meetings with the teachers. It is development (sic) for the HoD to interpret the report". He did however use the feedback to report to the SGB and DoE officials to motivate for extra support and funding for the school.

6.4.2.2 Types of use

In School E, the data were used to ***support conversations*** between the Grade 1 teachers about the efficacy of any new activities, pupils in need of support and possible adjustments to the curriculum. "It is important for us to share what activities are working or not" (Interview, Teacher 1). Use of data encouraged communication between teachers from Grade R to Grade 3 to facilitate an alignment of goals for the school and to coordinate curriculum planning. "… [A]ll the Foundation Phase and Grade R teachers meet about the feedback, because they will all see these children somewhere down the line." (Interview, Principal). The feedback was reported to the school, to the SGB and used to garner additional funding from external funders, as well as the DoE. Upon occasion, the data were used in parental discussion as an external validation of teacher evaluations and recommendations. "Sometimes the parents won't believe us that their child is struggling. Then we can show them the marks and say look this was done scientifically by the university, it is not just in our tests that he is struggling" (Interview, Teacher 2)

The principal and HoD discussed the results from the reports to establish the ***professional development needs*** of the school. Based on discussions, private and DoE training opportunities were identified to address the needs. The principal also saw the process of working with the data as a professional development opportunity for his staff and therefore supported his HoD in interpreting the data. These data underwent further analysis to establish if the SIOP intervention was having an impact on the pupils: "It was good to see that the vocab.(sic) results increased so considerably, it seems as if the SIOP is working" (Observation, HoD)

These data had a direct impact on the ***curriculum development*** for the whole school through the Curriculum Developer (deputy principal). "The reports definitely get used… eventually they end up with our deputy principal for curriculum development" (Interview, Principal). A 15-minute school-wide daily reading period was introduced, based in part on the data from the SAMP feedback. The aim of the reading period was to improve pupil literacy across the school. The curriculum development was also impacted directly through the formal teacher meetings of the Grade R- Grade 3 teachers.

The principal employed the SAMP feedback to meet the ***accountability demands*** of the SGB and the DoE through the mandated IQMS. "See, [shows IQMS file] I even have your documents in my IQMS file" (Interview, Principal). Data were not viewed in isolation in School E, but triangulated with classroom assessment data and the principal's classroom observations. The teachers appreciated the opportunity to validate their assessment standards with an external source. This was particularly useful in the difficult task of identifying pupils who were at risk

of failing halfway through the school year. “It is difficult to identify the learners, you always wonder… now we can look at the feedback results as back-up” (Interview, Teacher 3).

The data were also used for formal ***goal setting***, to evaluate the success of actions based on the data. Measurable goals were set in terms of achieving gains as well as achieving a minimum final score. “The overall score is higher than last year. The score on the Rhyming Words subtest is worrying. The gain is smaller than last year. We said we wanted to increase the gain.” (Observation, HoD). The school was also concerned with maintaining a high standard relative to other schools with similar characteristics in the sample. The principal was therefore able to ***monitor*** both the gains of pupils and performance of the teachers in achieving the goals set.

6.4.3 Sibongile (School S)

Sibongile’s school was situated in a township area. The language of learning and teaching in the School S had always been Sepedi. Pupils were predominantly from the local area. The socio-economic status of the area was very poor and many of the parents were unemployed and fairly young.

The school principal was committed to ensuring the smooth running of the school and that the school was an asset to the community. The school was sensitive to the plight of the community and often provided food parcels to hungry families. The school was also frequently involved in dealing with the social problems and poverty the children faced in the home environment. Sibongile and her staff would often be the first place children who were experiencing abuse or neglect in the home environment would turn to for help. Parental involvement in the school was limited and Sibongile noted that many pupils experienced little support in the domestic environment as parents were often absent. Many of the teachers in the school had received only basic formal educational training (some under the apartheid government). Sibongile was trying to address this low level of pre-service training through professional development activities presented by the DoE.

6.4.3.1 Data path – Top-Down Approach

All the Grade 1 teachers attend and participated in the feedback sessions. Sibongile, as principal, took responsibility for the use of the feedback and usually attended the sessions as well, along with her Grade 1 teachers. Sibongile read and interpreted the reports for the teachers: “I summarize it and tell the teachers what the report says …informally in the hallways or on class visits, also in the meeting after we receive the reports.” (Interview, Principal). This ***Top-Down Approach*** is illustrated in Fig.6.3. Sibongile also communicated directly to the Grade R and Grade 2 teachers about the feedback as it applied to them. Teachers informally discussed individual pupils and specific suggested activities with each other. The Grade 1 teachers mainly examined the report in terms of individual pupil results and the conclusion section with the suggested activities.

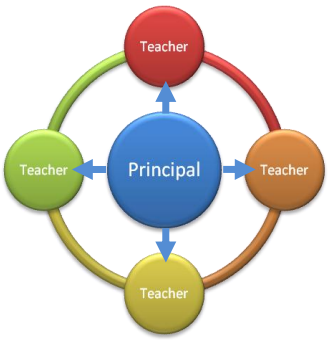

Fig. 6.3 School S data path: Top-Down Approach

6.4.3.2 Types of use

In School S, the data were used to ***support conversations*** between the Grade 1 teachers concerning the various suggested activities, pupils in need of support or extra stimulation and possible adjustments to the curriculum. "We haven't tried these activities [points to suggested phonics activities in report]. This may help with the phonics problem; we can try some rap songs" (Observation, Principal). The data were sometimes used to support conversations with parents about pupils experiencing problems or at risk of failure. "The other day one of the grandfathers wouldn't believe his grandchild was failing, he was giving the teacher a real tough time. Once she showed him the marks from your test [referring to SAMP], he believed her" (Interview, Principal).

The principal interpreted the data and explained to the Grade R and Grade 1 teachers what ***curriculum development*** was required. She then also monitored to see if the changes were taking place at classroom level. "I am in and out of classes all the time, talking to the teachers and seeing if they are doing what we talked about" (Interview, Principal).

The principal supported the teachers in using the data to triangulate with their own classroom assessment standards. In this way the teachers could establish if they were marking at an appropriate level. The data were also compared to the results of pupils who were identified to the DoE as being at risk of failure.

The principal facilitated formal ***goal setting***, operationalized in terms of gains, relative achievement to other schools and minimum final results in the feedback reports. "As long as we are showing a gain, I am happy" (Observation, Principal). These goals made it possible for the principal to ***monitor*** pupil gains and teacher performance. The goals also served as a motivational factor for the teachers. "Just look how happy they are when they hear the results" (Interview, Principal).

6.5 DISCUSSIONS AND CONCLUSIONS

All three schools presented in this chapter used the data for multiple purposes as illustrated in Table 6.1 (Based on Schildkamp & Kuiper, 2010). Each school however had its own data path either a Team, Cascade or Top-Down data path.

Table 6.1 Summary of school data use

USES		School A/E  Team	School E  Cascade	School S  Top-Down
Supporting Conversations	Teachers:			
	Grade R/Pre-school	×	×	×
	Grade 1	×	×	×
	Grade 2	×	×	×
	Grade 3		×	
	School Governing Body	×	×	
	Departmental Officials		×	
	Professional Development Providers	×	×	
	Funders	×	×	×
	Parents	×	×	×
Professional Development	Increasing Data Literacy	×	×	
	Identifying Training Needs	×	×	
Curriculum Development and Planning	Grade R	×	×	×
	Grade 1	×	×	×
	Grade 2	×	×	
	Whole School	×		
	Curriculum Developer[7]		×	
	School Based Support Team[8]	×		
Meeting Accountability demands	Integrated Quality Management System [9]	×	×	
	School Governing Body	×	×	
Goal Setting	Gains	×	×	×
	Final Results	×	×	×
	Relative to Other Schools	×	×	×
Monitoring	Teacher Performance	×	×	×
	Pupil Gains	×	×	×

[7] The curriculum developer is the person in the school responsible for the overall curriculum development and alignment for the school. Nor all schools make provision for such a role.

[8] A School Based Support Team (SBST) usually comprises a group of experienced teachers who plan for supporting individual learners who have been identified as being at risk within the school. The team acts as a resource for individual teachers throughout the different grades.

[9] The IQMS consists of three programs aimed at enhancing and monitoring performance of the education system. The three programs are: Developmental Appraisal to determine and address individual teachers development needs, Performance Management for teacher progression and Whole School Evaluation to evaluate the overall effectiveness of a school as well as the quality of teaching and learning. (Education Labour Relations Council, 2003).

There seems to be evidence of overlapping of different types of use, depending on the purpose. The three schools employed very different data paths for use in their schools. Pieter's school used a Team Approach, combining the skills and data from the HoD, principal and teachers who all worked together to interpret and eventually set goals and monitor the achievement of the goals. Rajesh's school followed a structured, Cascade Approach, with each person in the path having a specific role. The data moved from the principal to the HoD, the teachers and then the curriculum developer. Sibongile's school used a Top-Down Approach with the principal relaying her interpretation of the data to teachers and the HoD while she also monitored how the improvement actions were implemented in the classes. All three schools used the data for multiple purposes as illustrated in Table 6.1.

Three distinct approaches to data-use that appeared to be appropriate for the three different specific contexts (schools) were identified and explored in this chapter: Team, Cascade and Top-Down. The data suggest that the most appropriate and effective approach of use may depend on the culture of the school, school leadership approach, level of teacher development, context and level of functioning of the school. A more advanced, sophisticated approach to data-use may not always lead to improvements, but may be disheartening and inappropriate in a specific context. For instance, Sibongile's School implemented the less sophisticated Top-Down Approach using basic analysis of individual data and overall differences in scores, which proved effective in transforming data into action in the school, through the principal's leadership and guidance. This level of data use was appropriate for School S as the teachers were hesitant to interact with complex data and data presentations, but felt comfortable interacting with the basic presentation of data. The Cascade Approach seems to function effectively when data use is to be combined with additional opportunities for professional development and conceptual learning. This could be seen in the case of School E, where continuous professional development was highly valued and the principal encouraged staff to take responsibility for data use and interpretation. The Team Approach suited the collaborative culture of School A/E where additional analysis and triangulation of different data were brought about via the principal's active role in facilitating the data-analysis and interpretation. The Team Approach, therefore provides the opportunity for a data-literate and data-focused individual to facilitate the data use process where most of the other participants do not have a natural aptitude, experience or preference for data use, resulting in a more sophisticated level of data use. These are only some of the possible effective data paths and there may be many others implemented in schools.

There are, however, certain commonalities in the approaches to effective data-use illustrated above. In all cases, the principals valued and emphasized the importance of data-based practice and planning, ensuring that formal time and space were created to work with the data, whether it was through arranging meetings, visiting classrooms or supporting HoDs in meetings with staff. Multiple role players were involved in the data analysis, interpretation and application process, from teachers to HoDs and principals, although not in the case of the Top Down approach where the teachers were provided with interpretations by the principal, Sibongile. Target setting was used to motivate teachers and monitor progress in the schools. School data were never viewed in isolation, but interpreted in conjunction with other sources through triangulation. In all cases, the data were used to facilitate conversations about the curriculum and individualized support with

role players such as other teachers from different grades, parents, the SGB and the DoE. Feedback was also provided with links to support material to provide a stepping-stone to action. Data must also be provided in such a manner that it meets the needs of different schools at various levels of data-use sophistication. From the case studies, it appears that an effective feedback system should thus try to establish or encourage these conditions for effective data use.

In terms of policy, it is essential that monitoring and data use policies provide the opportunity and time for use of data. As can be seen in all three cases formal meetings were arranged to interact with the data and discuss planning, as well as monitor progress in schools. It would also be beneficial if training in data literacy and data use for planning and evidence practice is mandated. This would equip users with the skills not only to report, but also to identify and use sources of information that are appropriate to ensure quality. The data in this chapter seems to suggest that policy on data use should not be prescriptive about school data paths, but should rather provide exemplars of various possible approaches which are appropriate for different contexts. In South Africa, the information that schools receive from government is not always sufficiently detailed to meet the decision-making needs of the varying school contexts. For this reason, it is important that there are layers of sophistication (different levels of detail, complexity of presentation and disaggregation) within the data which the school can access as needed for its particular milieu.

6.5.1 Reflection questions for practitioners

1. What sort of data path is your school currently using?
2. How are different role players in your school involved in the data analysis, interpretation and application process throughout the data path?
3. How appropriate is your school's current data path for your school culture, school leadership approach, level of teacher development, context and level of functioning of the school?

6.5.2 Reflection questions for policy makers

1. How do policies in your country[10] support development of data literacy in schools?
2. To what extent does your country's current policy prescribe school data paths? What impact may this have on the effectiveness of data use in different school contexts in your country?
3. How do the policies in your country encourage school data use?

[10] Policies are referred to here as relating to a country, it may however refer to policies for a specific region, state or province depending on how a specific county's education system is structured.

6.5.3 Reflection questions for researchers

1. Three possible data paths were identified in this chapter. How can other data paths be identified through further research? How would you approach this research in your country?
2. Certain data paths such as the Top-Down approach are generally viewed as less desirable. How can the school milieu mediate value judgments about approaches to data use?
3. How can data feedback systems, which are able to meet the needs of different schools at various levels of data-use sophistication, be developed?

6.6 REFERENCES

Archer, E. (2010). *Bridging the gap: Optimising a feedback system for monitoring learner performance.* University of Pretoria: Pretoria.

Black, P., & Wiliam, D. (1998a). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, *5* (1), 7-75.

Black, P., & Wiliam, D. (1998b*). Inside the black box: Raising standards through classroom assessment.* Retrieved June 7, 2004, from http://www.pdkintl.org/kappan/kbla9810.htm.

Campbell, C., & Levin, B. (2009). Using data to support educational improvement. *Educational Assessment, Evaluation and Accountability*, *21*(1), 47-65.

Cradler, J. (2008). *Data-driven decision making and the electronic learning assessment resources (ELAR)*. Retrieved May 12, 2010 from http://www.clrn.org/elar/dddm.cfm.

De Villiers, M. R. (2005). Three approaches as pillars for interpretive information systems research: development research, action research and grounded theory. *Research for a changing world: proceedings of South African Institute for Computer Scientists and Information Technologists 2005 conference* (pp. 111-120). White River: SAICSIT.

Department of Education. (2002). *Revised National Curriculum Statement Grades R-9 (schools)*. Retrieved October 25, 2006, from http://www.polity.org.za/pdf/Curriculum.pdf

Department of Education. (2006a). *Grade 3 Foundation Phase National systemic evaluation report.* Pretoria: Government Printer.

Department of Education. (2006b). *Grade 6 Intermediate Phase Systemic Evaluation Report.* Pretoria: Government Printer.

Department of Education. (2006c). *The national policy framework for teacher education and development in South Africa: more teachers; better teachers.* Pretoria: Department of Education.

Earl, L. M., & Katz, S. (2006). *Leading schools in a data-rich world.* London: Sage Publications.

Education Labour Relations Council. (2003). *Training manual on the Integrated Quality Management System*. Retrieved April 16, 2007, from www.elrc.co.za/UploadedDocuments/IQMS%20Training%20Manual.doc

Gawe, N., & Heyns, R. (2004). Quality assurance. In J. G. Maree, & W. J. Fraser (Eds.), *Outcomes-based assessment* (pp. 159-184). Sandown: Heinemann Publishers.

Halverson, R. (2010). School formative feedback systems. *Peabody Journal of Education, 85*, 130 – 146.

Harris, A., Chapman, C., Muijs, D., Russ J., & Stoll, L. (2006). Improving schools in challenging circumstance: Exploring the possible. *School Effectiveness and School Improvement, 17* (4), 399-407.

Hattie, J., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research, 77* (1), 81-112

Hibberd, B.J., & Evatt, A. (2004). Mapping information flows: A practical guide. The *Information Management Journal, 1*, 58-64.

Howie, S. J., Venter, E., Van Staden, S., Zimmerman, L., Long, C., Scherman, V., et al. (2008). *Progress in International Reading Literacy Study (PIRLS) 2006 summary report: South African children's reading literacy achievement.* Pretoria: University of Pretoria.

Howie, S.J. (2008). *Measuring the health of the education system: lessons from international studies for South Africa.* Keynote address, presented at Association for the Study of Evaluation and Assessment national conference, Pretoria, July 2008.

Howie, S.J. (2010). ICT-supported pedagogical policies and practices in South Africa and Chile: emerging economies and realities. *Journal for Computer Assisted Learning, 26* (6), 507-522.

Kamel, N., Narasipuram, M. M., & Toraskar, K. (1997). An approach to value-based modelling of information flows. *The Information Society, 13*, 93-105.

Kluger, A. N., & Denisi, A. (1996) The effects of feedback interventions on performance: a historical review, a meta-analysis, and a preliminary feedback intervention theory, *Psychological Bulletin, 119*, pp. 254-284.

Krovi, R., Chandra, A & Rajagopalan, B. (2003). Information flow parameters for managing organisational processes. *Communications of the ACM, 46* (2), 77-82

Mano, M.M. & Kime, C.R. (2004). *Logic and Computer Design Fundamentals* (3rd ed). Englewood Cliffs: Prentice Hall.

Martin, M. O., Mullis, V. X., Gonzalez, E. J., & Chrostowski, S. J. (2004). *TIMSS 2003 International science report.* Boston: TIMSS & PIRLS International Study Centre.

Naker, D. (2007). *What is a good school? Imagining beyond the limits of today to create a better tomorrow.* Kampala: Raising Voices.

Nieveen, N. (1997). *Computer support for curriculum developers: A study of the potential of computer support in the domain of formative curriculum evaluation.* Enschede: PrintPartners Ipskamp.

Plomp, T. (2009). Educational Design Research: an Introduction. In T. Plomp, & N. Nieveen (Eds.), *An Introduction to Educational Design Research: Proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China), November 23-26, 2007* (pp. 9-37). Enschede: SLO.

Richey, R. T., Klein, J. D., & Nelson, W. A. (1996). Developmental research. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 1213-1245). New York: Macmillan.

Salpeter, J. (2004). Data: Mining with a mission. *Technology , March*, 30-36.

Saunders, L. (1999). Who or what is 'self'-evaluation for*? School Effectiveness and School Improvement, 10*(4), 414–429.

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

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research, 78* (1), 153-189.

The Urban Institute. (2004*). Analysing Outcome Information: Getting the most of data.* Retrieved November 5, 2009 from http://www.urban.org/UploadedPDF/310973_OutcomeInformation.pdf.

Thijs, A. (1999). *Supporting science curriculum reform in Botswana: The potential of peer coaching.* Enschede: PrintPartners Ipskamp.

Tymms P & Coe R 2003. Celebration of the success of distributed research with schools: The CEM Centre, Durham. *British Educational Research Journal, 29,* 639-653.

United Nations Children's Fund (UNICEF). (2000). *Defining quality in education.* New York: United Nations Children's Fund.

Van den Akker, J. (1999). Principles and Methods of Development Research. In J. J. Van den Akker, R. Branch, K. Gustafson, N. M. Nieveen, & T. Plomp (Eds.), *Design approaches and tools in education and training.* Dordrecht: Kluwer Academic Publishers.

Van den Berg, S., & Burger, R. (2002, October 22-24). Education and socio-economic differentials:A study of school performance in the Western Cape. Paper presented at the 2002 DPRU/FES conference, Johannesburg, South Africa Retrieved June 9, 2010, from www.commerce.uct.ac.za/Research_Units/DPRU/Conf2003PDF/Conf2002pdf/VdBergBurger.pdf.

Van Petegem, P., & Vanhoof, J. (2005). Feedback of performance indicators: A tool for school improvement? Flemish case studies as a starting point for constructing a model for school feedback. *Revista Eletronca Iberoamericana sobre Calidad, Eficacia y Cambio en Educa-*

ción, 3 (1), 222-234, Retrieved January 30, 2007, from http://www.ice.deusto.es/rinace/reice/vol3n1_e/VanPetegemVanhoof.pdf.

World Bank. (2008*). World Development Indicators*. Washington: Word Bank.