Generation and use of data in the Western Cape in the delivery of basic education

Final report of 28 February 2017

Contents

EXECUTIVE SUMMARY

The current report forms part of a larger project examining **problems and solutions in the collection and use of data in provincial education systems** in South Africa. This report focusses on Western Cape's schooling system, a system often considered exemplary in terms of its information systems and processes in the national context.

This Western Cape analysis draws largely from interviews with Western Cape Education Department (WCED) **head office officials**, but also a few district- and school-level interviews conducted to verify responses provided by head office officials. Moreover, extensive **document analysis** occurred, including analysis of documents not in the public domain. Section 2 explains that the analysis used a framework which emphasises **human capacity** and **organisational culture**, apart from the **actual information systems**.

Section 3 offers a high-level assessment of why WCED seems relatively effective at collecting and using data to enhance education service delivery. Six critical elements are identified. Firstly, **effective leadership** has created an enabling and stable environment which has allowed for persistence in the pursuit of specific information systems solutions. Secondly, there has been a strong emphasis on **accurate monitoring of learning outcomes**, resulting in a situation where the province has exceptionally good data on what is arguably its central deliverable. Thirdly, by **harnessing web-based technologies** many years ago the province has built up systems development and user capacity in a manner that facilitates the efficient sharing and processing of data. Fourthly, the province has focussed on **building a strong organisational centre** with a single institution responsible for systems development, an institution which has proven to be effective and responsive. Moreover, the province has departed from the tradition that former teachers should predominate in the administration of the schooling system, and has recruited an effective mix of professions into management positions. This has assisted in the development of information systems. Fifthly, by **responding incrementally to specific operational needs**, WCED has avoided the common trap of attempting overly ambitious systems development, with high risks of failure. Six, WCED's strategy has paid attention to **respecting the agency of school principals**. There are several instances where school principals are given choices when it comes to deciding what systems to use, and how. This approach helps to ensure that systems respond as far as possible to the needs of schools.

Sections 4 and 5 describe WCED's data and systems in some detail and arrive at recommendations for future enhancements. Whilst WCED's systems are in many respects exemplary, the province is on a development trajectory and there is much room for improvement.

The high-quality **Grade 12 examinations data**, which in the case of Western Cape include values down to the level of 'question' in the sense of clusters of items, are used extensively to inform conversations and actions relating to educational improvement at the secondary school level. However, their use could be enhanced through, for instance, the construction of **more comparable and fairer measures of school effectiveness**. The latter involves, in particular, combining the examinations data with enrolment data, to gauge dropping out before Grade 12, and new measures of socio-economic status using, for instance, census data.

WCED's **systemic tests programme**, applicable in grades 3, 6 and 9, is a pioneering programme from which the country could learn much, given the scarcity of experiences and knowledge in the area of standardised testing. The continuation of this programme for at least some years, regardless of the outcome of the current re-designing of the Annual National Assessments (ANA) programme, is important not just for Western Cape, but the country. Going forward, WCED's systemic tests should produce **more rigorously comparable school-level measures** through better use of item response theory (IRT) methods now

employed widely in many countries. Moreover, the provincial and national authorities should ensure that this programme features strongly in the country's efforts to improve capacity in the area of standardised testing.

WCED, of all the provincial departments, has the longest experience with the use of a **central database of individual learners**. WCED is able to use this database for a number of purposes, largely because the fact that data are communicated via the internet allows the system to be virtually 'live'. However, in many respects the system is seriously under-utilised. In particular, it ought to be used to a greater degree to **monitoring dropping out**, so that strategies to counter this phenomenon are properly informed by drop-out patterns.

With regard to **finance data**, a priority should be to strengthen the in-year monitoring of spending and, in particular, **projections of expected spending for the rest of the financial year**. In Western Cape, as in other provinces, this has been a problem, largely because there are delays in the data entry of some personnel expenditure. This creates difficulties in the budgeting process. Recent improvements in WCED seem to suggest the solutions are more a question of **human capacity and customised forecasting tools** than changes to the design of the main financial accounting systems.

WCED's 40,000 or so employees lie at the heart of successful service delivery and account for 85% of overall spending. One indication that WCED understands the centrality of its employees is its 'customer satisfaction surveys', which have for many years gauged the satisfaction of schools-based employees with respect to various aspects of WCED's operations. Yet the **efficiency and equity of the current human resourcing practices should be better understood** using a variety of data sources including the Persal payroll data, teacher-related data on CEMIS (WCED's own management information system), and scores from the performance management system governing educators (the IQMS). Areas where monitoring could be strengthened include **learner-educator ratios** (in particular the across-school equity of this and the impact on this of additional staff hired by the school), **class sizes**, the **match between teacher qualifications and the subjects they teach**, the **allocation of teacher time** within schools and **correlations between the IQMS scores of teachers and learner performance**.

The prioritisation of schools for **infrastructure development and maintenance** is an area where political pressures easily trump data-driven planning. WCED could strengthen the latter through a greater use of **publicly available and easy-to-read school priority lists** and transparent criteria on when deviations from the lists are permitted.

List of acronyms

AG	Auditor-General
ANA	Annual National Assessments
BAS	Basic Accounting System
CBA	Competency-based assessments
CEI	Centre for e-Innovation
CEMIS	Central Education Management Information System
CPTD	Continuing Professional Teacher Development
CSS	Customer satisfaction survey
CTLI	Cape Teaching and Leadership Institute
DBE	Department of Basic Education
DPSA	Department of Public Service and Administration
EPRE	Estimates of Provincial Revenue and Expenditure
IQMS	Integrated Quality Management System
IRT	Item response theory
LURITS	Learner Unit Record Information Tracking System
NAP	National Assessment Programme (Australia)
NEIMS	National Education Infrastructure Information Management System
NSC	National Senior Certificate
PFMA	Public Finance Management Act
PISA	Programme for International Student Assessment
PMPS	People Management Practices System
PwC	PricewaterhouseCoopers
SACE	South African Council for Educators
SADTU	South African Democratic Teachers Union
SAMI	School Admission Management Information
SASA	South African Schools Act
SA-SAMS	South African School Administration and Management System
SBA	School-based assessment
SES	Socio-economic status
SIM	School Improvement Monitoring
SIP	School improvement plan
SITA	State Information Technology Agency
TIMSS	Trends in International Mathematics and Science Study
UAMP	User asset management plan
WCED	Western Cape Education Department

1 Introduction

The current report has been produced as part of a project examining the use of data in two South African provinces, **KwaZulu-Natal** and **Western Cape**, to support service delivery in schools. The inception report for the project provides details on the project design[1]. The project is titled '*Assessment of education department data use in provinces and the formulation of recommendations aimed at improving systems and service delivery outcomes*'. The scope of the project can be described as 'data generation and use', where 'data' means databases, and not, for instance, digital materials used in the classroom for teaching and learning. The inception report moreover explains that the products of the current project, including the current report, are primarily aimed at officials in Treasury, both national and provincial, the national Department of Basic Education and the nine provincial education departments. Thus the two provinces are used as case studies from which a wide range of stakeholders can learn, the aim being to arrive at specific solutions which can accelerate the move to quality service delivery driven to a greater degree by effective data use.

In many respects, Western Cape can be considered an **exemplary province** when it comes to the effective use of data to enhance education service delivery, but also in terms of other aspects of education. A problem in the past has been that there has been little **systematic documentation** of practices in Western Cape, which has made across-province learning more difficult. The current report is meant to assist in closing this gap. But the report is also directed at Western Cape planners insofar as it makes suggestions around the next steps to be followed to further improve education services through the effective use of data.

The scope of the report is the approximately 1,460 **public ordinary schools** in the Western Cape. The focus is thus not on the approximately 200 independent schools in the province, or the 79 public special schools. These other groups of schools would fall within many of the systems described in the current report, but their experiences and circumstances would be different.

The inception report indicates that there is a need to use some of the project's resources to produce tools with very specific purposes, apart from the overall analysis of data generation and use in the schooling sector. The specific tools which will be produced are **school-level report cards** drawing from Grade 12 examinations data. This partly explains why the current report pays special attention to Grade 12 data.

A further special area of focus in the project is how provincial departments **plan and manage spending on educators and teachers**, a topic which would include the hiring of these professionals, the management of salaries and benefits, performance management to promote 'value for money' in the sector, and incentives aimed at retaining educators in the sector.

The current report is informed by an extensive **literature review**[2], which includes an interview tool used to guide the interviews with officials in the Western Cape Education Department (WCED) held during July 2016. Readers are encouraged to consult the literature review, as well a report similar to the current one dealing with systems in KwaZulu-Natal.

The current report is structured as follows:

- Section 2 outlines briefly the process of interviews held with Western Cape officials and how the researchers approached the task of preparing the current report.

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[1] The seven-page inception report is dated 18 May 2016.

[2] Title *Towards better generation and use of data within the basic education sector: Literature review and interview tool* (date 18 August 2016).

- Section 3 provides a **high-level description** of the **organisational culture** and **human capacity** which guide and support the use of data in the management and planning of schools in Western Cape.

- Section 4 provides a diagram of the data and systems used by WCED, plus an accompanying narrative.

- Section 5 describes how the department uses data under eight headings: (1) The view from the school; (2) Grade 12 examinations; (3) Pre-Grade 12 assessments; (4) Learner participation data; (5) Finance data; (6) Human resources and payroll data; (7) Physical infrastructure data; (8) Learning materials data.

- Section 6 examines the actual and potential use of the various data sources of WCED for more in-depth research aimed at understanding how educational improvement is brought about and what to focus most on in the coming years.

- Section 7 provides suggestions in relation to the complex matter of how other South African provinces (and perhaps even schooling systems beyond South Africa) could learn from the Western Cape. What would be replicable in other contexts? What are the necessary enabling factors? What do the experiences in Western Cape suggest one should perhaps *not* do? Why do attempts to learn from 'best practice' systems so often lead nowhere?

2   How the current report was produced

The report draws to a large extent from **three days of interviews** with senior officials conducted at the head office of the Western Cape Education Department in Cape Town in July 2016. A project link person in the department identified officials who would be relevant for the interviews, using a list of topics to be covered. Interviews were mostly small, often with just one interviewee at a time. It was made clear to interviewees that no names would be mentioned in the current report, and that as far as possible the two researchers (Dr Martin Gustafsson and Dr Nick Taylor) would ensure that it would not be possible to link specific opinions reflected in the report to individual interviewees. These measures were adopted in order for interviewees to be as frank as possible. Interviews were guided by questions relating to the interviewee's area of focus, but interviewees were encouraged to discuss any issue they thought was relevant for the project, and new questions arose as interviews proceeded.

The report moreover draws from **interviews conducted at six schools** in one district in the province, two schools being secondary schools and the other four primary schools, and **officials from the district office**. Whilst such interviews can obviously not produce information representative of the entire province, they served as vital checks on information provided by officials at WCED's head office, and led to important revisions and nuancing of the originally collected information.

The current report also draws from a number of documents: the literature review mentioned in the previous section (that review includes an analysis of the 2014 and 2015 annual reports of WCED); documents and tools provided by interviewees; various additional reports which seemed informative for the analysis; WCED circulars available on the WCED website.

The literature review discusses the framework illustrated in Figure 1 for understanding improvements in data systems. This framework emphasises that the development process is not just about fixing policies, institutions and systems. These are clearly important, but so is developing the human capacity which must run systems, and the organisational culture that influences human behaviour. This thinking informs the current report to a large extent, and

hence the diagram is repeated here. A fuller discussion of the framework is presented in the literature review.

Figure 1: Systems, human capacity and organisational culture

A THREE-WAY FRAMEWORK FOR IMPROVING DATA GENERATION AND USE

ORGANISATIONAL CULTURE

Linking all that is done to service delivery outcomes

Rewarding accuracy and honesty

Distinguishing 'spin' from analysis

☠ Inability to design and improve systems, even to use them

☠ Fragmented, inefficient practices

HUMAN CAPACITY

Strong focus on data dealing with educational outcomes

THE OPTIMAL COMBINATION

Ability to work with imperfect data without compromising on integrity

Documentation that makes systems more institutionalised

☠ Good people with few incentives to do the right thing

Professionals who are guided by principles, not just basic compliance

POLICIES, INSTITUTIONS AND SYSTEMS

Report-writing skills

There is a strong emphasis in the current report on making explicit what data and statistics are **publicly available on the Web**. When materials are available on the Web, the scope for their use obviously widens considerably. Parents, accountability structures and researchers then get to access information they may otherwise not have had. The researchers in the current project did not have access to user-restricted areas on the Web, for instance areas accessible just to school principals. Such access was considered beyond the scope of the project and access was not requested. Discussion of these user-restricted Web facilities in the current report is based on second-hand descriptions.

The following questions guided the writing of the current report:

▪ What are the **basic details** of existing systems, policies and institutions which underpin the availability and use of data in WCED? In particular, the focus was on data whose use does or could enhance service delivery and in particular improvements in educational outcomes.

▪ What **problems** do officials see in the existing systems, and what problems do the researchers see? What problems do schools experience? What are the next steps and also the long-range vision with respect to taking existing systems forward, in the opinions of the officials and researchers?

▪ What are the **lessons** for education systems in general, but South Africa's provinces specifically, which could be drawn from the past experiences of WCED?

Systems of the kind described in the current report are of course dynamic. Procedures change over time. As far as possible, the current report focusses on systems as they existed in 2015 and 2016. When the report was being compiled, the 2016 school year was only half completed.

3   A high-level description of WCED, its data and service delivery

The details provided in the subsequent sections of this report seem to confirm that the Western Cape Education Department (WCED) is a relatively successful provincial education department in the South African context. **Visits to WCED by officials from other provincial education departments** aimed at learning from WCED are common, and from this report it seems clear why this would be the case.

Although the current report focusses on data collection and use, data have become so pervasive in education systems that assessing an organisation's data gets close to assessing the organisation in general. The organisation's data becomes **a window onto its general culture and effectiveness**.

The conclusions of the current report must be read with the understanding that the assessment drew mainly from **interviews with key people** and some **analysis of policies** (in particular WCED's circulars) and **reports** such as WCED's annual reports. The assessment involved very little examination of actual microdata ('raw data' before its conversion into statistics), though there is some of this. This limits the current report a bit. Yet it arguably represents a particularly systematic and holistic assessment of one education department's data, thereby filling a gap which seemed to exist in the research terrain.

WCED, like all of South Africa's provincial education departments, is on a **development trajectory**. Systems have been built, but there is a lot of work which must still be done. The latter is dealt with in the report. But it is also argued that WCED can indeed be considered an exemplary education department which other departments could learn from. How is this conclusion arrived at? Three justifications stand out.

Firstly, evidence points to **schooling outcomes being relatively good in Western Cape,** *even after one controls for the socio-economic advantages enjoyed by the province*. Given these advantages, one would expect exceptionally good education results in Western Cape. But what is important is that specific groups of learners in Western Cape perform better than *similarly socio-economically* disadvantaged learners in other provinces, according to reliable data sources such as SACMEQ[3]. If this were not the case, there would be much less reason to find effective-looking data systems interesting and important. Systems are only truly effective if there is some reason to believe that they contribute towards better learning and teaching, in particular as far as historically disadvantaged school communities are concerned.

Secondly, the people working in Western Cape's schooling system tend to express confidence and satisfaction with the processes around the collection and use of data. There are some important exceptions discussed in the report, but on the whole there seems to be a level of satisfaction which is exceptional by South African standards. Moreover, what is unusual in the South African context is that WCED has relatively good data on the levels of satisfaction of its employees. The current report takes the position, based partly on the literature review that preceded this report, that **at the heart of good data and systems are good human resources**. Impressive-looking computerised systems would mean little if the people working with them did not believe these systems added value to their work.

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[3] See Figure 18 in Department of Basic Education (2013). See also Wills, Shepherd and Kotze (2016).

Thirdly, the **reports** produced by WCED reflect a relatively **high level of interest and expertise in the use of data and statistics** for planning. In many ways reports such as an organisation's annual report are not just about the matter at hand, for instance the developments over the last financial year. They also reflect qualities like the ability of the organisation's planners and managers to think critically and pay attention to detail.

Drawing from the case of Western Cape, what can be identified as critical elements another education authority should pay special attention to? Put differently, what are some strengths WCED should aim to preserve and develop further? **Six critical elements** are identified below.

Critical element 1: Effective leadership. WCED's leadership has, over the years, been persistent in pursuing specific systems priorities. This is remarkable, particularly if one considers many important initiatives have spanned several politically disparate provincial governments, and periods of considerable political turbulence[4]. Stability in terms of the top administrative leadership seems to have contributed to appointments of enough officials capable of driving long-term development and to an enabling environment that has been conducive to sustainable systems development. This echoes what has been emphasised in several reports of the Auditor-General, which have pointed to the importance of effective heads of department and senior management for the emergence of sustainable information systems and good reporting practices[5].

Critical element 2: Accurate monitoring of learning outcomes. As early as 2002, WCED invested in an innovative programme to monitor what learners learn at the primary level, with a special focus on ensuring that the programme could monitor whether there was progress over time. Apart from serving as a tool for monitoring progress in the schooling sector as a whole, the programme sent a clear signal to schools and officials that learning was at the heart of WCED's work.

Critical element 3: Harnessing web-based technologies. WCED successfully invested in integrated web-based data systems at a relatively early stage, when other government departments were responding to new data needs largely by introducing stand-alone systems. WCED was able to do this partly because leaders realised that the higher initial cost of investing in this technology would be justified by more efficient movement and management of data. Because WCED established many of its key web-based systems as much as a decade ago, its systems are now somewhat antiquated. Yet they still fulfil their purposes relatively well, and the accumulation of experience over the years places WCED and its systems development partners in the Premier's Office in a good position to modernise existing systems. Apart from using the Web for the inputting and distribution of data, WCED has also used the Web in other ways to facilitate the functioning of the schooling system. WCED has been particularly effective at archiving, on its website, circulars directed at schools and other levels of the system. Many circulars focus on how data should be submitted and used. This creates a level of certainty on these matters, which is clearly necessary for a smooth running of the system.

Critical element 4: Building a strong organisational centre. WCED has focussed strongly on building systems capacity at the centre, specifically at the WCED head office. This has been achieved partly by departing from the tradition that managers in the education system should all be former teachers. Instead, WCED has encouraged people from other professional backgrounds to apply for vacant management posts, and has appointed such people when it

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[4] A report by the Public Service Commission (2008) indicates that as far back as 2003 Western Cape had become relatively successful at maintaining stable leadership with respect to heads of department, despite political instability.

[5] See for instance Auditor-General (2015: 142).

seemed best for the organisation. Actual computer software development has been concentrated for many years in the Centre for e-Innovation (CEI) in the Premier's Office, which has been highly responsive to WCED's needs. Some might criticise WCED for not having concentrated more on encouraging systems innovation and data access at the level of the district and school. Such decentralisation of innovation has been advocated strongly by some. WCED's history suggests there is a convincing counter-argument. It is possible that efforts first need to go towards strengthening human capacity and systems at the centre, so that when a more decentralised approach to data use is initiated, there are already good data standards and a core group of knowledgeable advisors to take the work forward. Moreover, an initial focus on work at the centre means that as innovative use of data for management purposes becomes more distributed across the system, the data that are used are of a high quality. There is evidence that innovative data use is becoming more common at the district and school levels in Western Cape.

Critical element 5: Responding incrementally to specific operational needs. As pointed out in the literature review, it is common in developing countries for overly ambitious but poorly focussed information systems to take off, but then lead to nothing, at great cost. WCED has avoided this trap by building its systems incrementally, in response to rather specific operational needs. It has not attempted to solve all problems at once. It has also not followed a grand and long-term systems development master plan. WCED could be criticised for not having a clearer sense of the longer-term trajectory of its systems, but clearly WCED's incremental approach has produced some impressive results and can be considered a workable strategy. WCED and CEI have moreover depended to a large degree on local programmers. Whilst this may not result in, for instance, state-of-the-art user interfaces, it has allowed WCED to customise systems to its needs in very specific ways, and has helped to build local human capacity. What WCED and CEI have thus not done is to adopt a high-cost enterprise system, which would have raised the budget cost of systems development considerably and possibly threatened the sustainability of systems. 'Off-the-shelf' enterprise systems may be the optimal solution for some schooling systems, but WCED's achievements suggest that alternatives approaches can work, at least during an initial period of development. However, it should be noted that several senior managers in WCED believe that as data demands become more complex in the coming years, WCED will have to explore 'off-the-shelf' software options.

Critical element 6: Respecting the agency of school principals. As pointed out in the literature review, good information systems are no guarantee that schooling is good. In fact, in any modern public sector there is a risk that data becomes an end in itself, even to the detriment of employee satisfaction and effective service delivery. Whilst some schools may argue that data have been over-emphasised, on the whole it appears as if WCED has avoided this trap, partly by respecting the agency of school principals and not attempting to micro-manage schools using data. For instance, in the case of some of WCED's operational systems, school principals can choose to use them, or alternatives if they believe this serves the interests of the school best. WCED's system of customer satisfaction surveys, run since 2009 and focussing on the satisfaction of schools-based staff, is indicative the seriousness of WCED's commitment to the centrality of the school, and to an avoidance of undesirable 'top-down' approaches.

This section has painted, on the whole, a very positive picture of WCED and its systems. It is indeed important to acknowledge which parts the country's education system function particularly well, so that this can inform developments across the country. Of course WCED is not the only source of 'good practice stories' in the country, nor is WCED without its own problems. **In a global context, learners in Western Cape in fact do not perform that well.**

They perform worse than socio-economically equivalent learners in Kenya, for example[6]. Western Cape's challenges are discussed in the remainder of the report.

4 A 'map' of WCED's data and systems

The diagram on the following page is designed to assist the reader in understanding the discussion which follows in section 5. Importantly, the diagram provides a systematic 'stocktaking' of the various data and systems discussed in section 5, but it is not intended to illustrate the inter-relationships between the various elements through, for instance, arrows. The latter would probably have made the diagram considerably more difficult to read. Inter-relationships are discussed in section 5.

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[6] Wills, Shepherd and Kotze, 2016.

A 'MAP' OF WCED's DATA AND INFORMATION SYSTEMS

★ refers to data which should arguably be prioritised for innovative knowledge-generation

ONLINE ACCESS FOR SCHOOLS

CEMIS (Central Education Management Information System)

SAMI (School Admission Management Information)
- Ordering of books and other materials
- Inventory of school furniture
- Learner applications for admission
- Learner details ★ (including barriers to learning and scholar transport details)
- Learner daily absenteeism
- Transfer out of learners

SIM (School Improvement Monitoring)
- School improvement plan (SIP)
- Update on e.g. materials and curriculum coverage (quarterly)

Recording and Reporting
- Annual Survey (includes teacher questionnaire) ★
- Aggregate grade- and subject-specific performance data (quarterly) ★

PMPS (People Management Practices System)
- Staff daily attendance
- Requirements for vacant posts
- Financial receipts

e-Recruit

Cash Book System

ONLINE ACCESS FOR EDUC-ATORS (Non-WCED system)

CPTD (Continuing Professional Teacher Development)
- Submission of professional development activities

REPORTS TO SCHOOLS
- Grade 12 examinations performance
- Systemic test school-level results for grades 3, 6 and 9

PAPER REPORTS FROM SCHOOLS
- Annual audited financial statement
- Grade 12 schools-based assessment (SBA) results per learner

WCED systems

Systemic tests database ★

- INFORMATION SUBMITTED OFFLINE BY SCHOOLS
- Employee performance management system ratings (IQMS) ★
- ONLINE ACCESS FOR APPLICANTS FOR MANAGEMENT POSTS
- CBA (Competency-based assessments)
- Customer satisfaction survey database
- WCED conditions of schools database

MAJOR MANAGEMENT INFORMATION INTERFACES

EduInfoSearch (includes post provisioning calculator)

Vulindlela

Major WCED system-level reports

PUBLIC
- Annual report (includes large human resources chapter)
- Citizen's report

NOT PUBLIC
- Systemic testing report: Aggregate results
- Systemic testing report: Technical details

LARGE NATIONAL DATABASES POPULATED AND USED BY WCED
- Basic Accounting System (BAS) ★
- Persal payroll ★
- National Education Infrastructure Information Management System (NEIMS)
- Learner Unit Record Information Tracking System (LURITS)
- Grade 12 examinations ★
- Annual National Assessments (ANA)

★ Stats SA household data

13

5   Parts of the Western Cape system

Section 5.1 provides the 'view from the school', in other words a description of the data a school deals with during the cycle of the school year. This section includes some critiquing of systems from a school perspective, drawing to a large degree on discussions with school-level people, in particular school principals.

Sections 5.2 to 5.8 then look further into specific systems. It is within these sections that ideas for future enhancements are explored. An attempt was made to avoid repetition across section 5.1 and the subsequent sections. A reader thus wanting to understand, say, Grade 12 examinations, should consult both section 5.1 and section 5.2.

5.1   The view from the school

The description in this section roughly follows the annual cycle of the school.

Of course schools differ, and many of these differences relate to **which grades schools offer**. In Western Cape, around 52% of learners are in schools offering Grade 1 (or Grade R) to Grade 7, meaning standard primary schools. Around 32% of learners are found in grades 8 to 12 schools, so standard secondary schools. A further 5% are in schools offering grades 1 (or R) to 12. The remaining 11% of learners would be in schools offering other grade combinations.

Annual customer satisfaction survey

The descriptions which follow draw in part from an important customer satisfaction survey (CSS) which WCED has conducted every year since 2009. In 2016, for the first time, the report from this survey was published on the WCED website[7]. The survey involves **collection of satisfaction data through one two-page survey form**, which school principals and other schools-based staff fill in. 2016 was the first year in which all schools were given the opportunity to participate. In previous years a large sample of around half of schools participated. Response rates are a bit low, though fairly typical for these kinds of satisfaction surveys: around 60% of schools provide feedback. In each school, up to five staff members may fill in survey forms.

Questions deal with the frequency of service use with respect to ten services, and satisfaction with respect to 43 aspects of WCED. Of these 43 aspects, the following seven received especially good ratings in the sense that at least 50% of respondents provided a rating of 'good' or 'excellent' and no more than 5% provided a rating of 'poor' or 'exceptionally poor': the WCED **website**; general **district office support**; **school visits for curriculum support**; support by **circuit managers**; training at the **Cape Teaching and Leadership Institute**; **systemic tests** in grades 3, 6 and 9; and support in the use of **CEMIS**[8].

Two aspects fared particularly poorly insofar as they were the only ones where over 30% of respondents said 'poor' or 'exceptionally poor'. These two were **infrastructure maintenance and support**, and **equipment and furniture supplies**.

Orders for the following school year

In preparation for the following school year, various items must be ordered and received, the bulk of this being **books** (stationery and cleaning materials are other major items). Books are bought using the publicly funded **financial allocation**, plus any funds that might be collected

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[7] Western Cape Government: Department of Education, 2016c.
[8] Central Education Management Information System.

privately, in particular through fees. Around 570 of the province's 1,460 schools are permitted to charge fees, and in fact do charge fees. All but around 300 schools are **'section 21' schools**, meaning they receive their full school allocation transferred into their bank accounts[9]. The approximately 300 schools, which are deemed not to have sufficient management capacity, receive only a limited financial transfer, and see the remainder of their budget spent on their behalf by WCED, though the school decides what the money should be spent on, subject to rules that apply to all schools[10].

Schools which are not section 21 schools are expected to place their orders for books through **CEMIS**, or the **Central Education Management Information System**. This is a web-based system each school is given access to, and close to 100% of schools use[11]. CEMIS, as will be seen below, serves a multitude of purposes. Section 21 schools may also order books through CEMIS, in which case funds will be deducted from the following year's school allocation. Otherwise section 21 schools would deal directly with book suppliers. Many section 21 schools do in fact order through CEMIS because of the convenience of doing this, and to some extent due to lower prices negotiated by WCED. The key thing is that section 21 schools are not obliged to order through CEMIS. CEMIS includes an automatic ceiling facility which prevents schools from ordering above what their school allocation permits[12].

Private suppliers deliver the books to schools after orders have been placed on CEMIS, on behalf of WCED.

CEMIS includes a facility for tracking the extent to which textbooks issued to learners are retrieved at the end of the school year. Schools must submit the relevant data through this facility[13].

The grades R to 9 **national workbooks** distributed to all schools by the national Department of Basic Education (DBE) are not paid for by the school, but numbers of workbooks per grade required in specific languages per school must be given to suppliers. These numbers are collected from schools through CEMIS. Moreover, CEMIS has a facility for capturing the number of workbooks actually delivered to schools[14].

Turning to **school furniture**, around 700 schools have access to a CEMIS facility allowing them to maintain inventories of their furniture. Furniture requests can be made to WCED, which then decides what requests are to be prioritised, partly on the basis of analysis of inventories of existing furniture and enrolment trends. Schools not on this system yet must make orders through a system of non-computerised application forms[15].

What schools generally consider ideal is to have **a full-time clerk to manage CEMIS** data capturing. Schools rely on a variety of solutions in this regard, including the hiring of a clerk using money from the school fund, and the use of interns provided to the school as part of provincial experiential learning programmes. School principals often battle to become sufficiently involved in the management of the school's data, partly because they lack the

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[9] WCED circulars 63 and 64 of 2015. WCED maintains a systematic archive of circulars at http://wced.school.za/circulars/index-circmins.html. It should be noted that although the circulars themselves are easily accessible, circulars often contain hyperlinks which do not take the user to the expected document (the user is simply taken back to the same circular).

[10] Unlike many other provinces, there are not different 'section 21' statuses, linked to different financial management rights. In Western Cape, schools either enjoy all the rights (and are then section 21 schools), or they receive no transfers in terms of the South African Schools Act section 21 functions.

[11] Section 5.4 provides more details on CEMIS.

[12] WCED circular 31 of 2015.

[13] WCED circular 59 of 2015.

[14] WCED circular 16 of 2015.

[15] WCED circular 68 of 2015.

required skills. The result is that principals are often not as aware as they should be of the quality of the data and the key statistics relating to the school. New and younger principals seem to cope better in this regard. Yet even here, having a clerk to perform the routine work relating to CEMIS is seen as vital.

Help desks to assist CEMIS users in schools are said to provide good support.

Learner details on CEMIS

A core function of CEMIS is to house details on all learners enrolled in schools. Learners entering the system as first-time applicants are registered by the school through a CEMIS facility referred to as the School Admission Management Information (SAMI). If a learner cannot be accepted due to, for instance, space limitations, this is indicated on CEMIS and WCED then uses its data to place the learner in an alternative school[16]. Much of this work is managed by the district office, which has access to the relevant information through online management reports. A critical question is how learners are moved from one school to another on CEMIS, for instance when they move from primary to secondary schools. This is handled through '**transfer out**' and '**transfer in**' steps. A school accepting a transferred learner should ideally see the learner as a 'transferred out' learner from another school. This is said to generally work as it should when it comes to learners moving within the province. However, learners arriving in Western Cape schools from other provinces do not have historical data which can be picked up by CEMIS.

If a learner experiences **barriers to learning**, for instance visual impairments, then this is included amongst the learner details entered on CEMIS[17].

If **a learner drops out** of school, and a school does not register the learner as having 'transferred out', a school could benefit unfairly by receiving resources such as the financial allocation for the learner. However, this problem does not arise frequently, partly because WCED conducts spot checks to see whether schools are failing to transfer learners out.

WCED officials and school staff generally agree that though CEMIS is good at performing its basic functions, it could be **more user-friendly and efficient** with respect to the design of its input facilities. Moreover, schools complain that at peak data entry periods, for instance when schools open at the start of the year, or at the end of a reporting quarter, CEMIS occasionally 'freezes'. It seems the central servers do not have the required capacity. Yet despite these problems it is noteworthy that in the customer satisfaction survey discussed above, CEMIS emerges as one of WCED's most valued services. Moreover, the interviews with school staff revealed, in general, considerable enthusiasm with CEMIS, to a large extent because the system is seen to save time.

Daily monitoring of attendance

Every day, by 10 in the morning, schools must complete an online form indicating **which publicly paid staff have not come to work**. The system is referred to as People Management Practices System (PMPS). The names of staff are all already on the system. When the average level of staff absenteeism in a school is considered unusually or problematically low, this is picked up by district officials, who then investigate the school. This follow-up does not always happen, and some officials believe it should be pursued more forcefully. Yet it is believed to occur frequently enough to dissuade undue staff absenteeism. They key thing is that a system is in place to monitor attendance on a daily basis. PMPS is also used to capture a variety of other human resources management information, for instance leave data.

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[16] WCED circular 12 of 2015.
[17] WCED circular 17 of 2016.

CEMIS includes a facility for indicating that **a specific learner is absent from school** on a day. The default is 'present', meaning it is only necessary to indicate an absence.

CEMIS learner details include details relating to entitlements to publicly funded **scholar transport**.

Staffing changes

In August of each year the school's '**post establishment**', or its entitlement to publicly funded posts, based on enrolment and curriculum offering patterns, is given to the school. The post establishment would be based on enrolment by grade and (for grades 10 to 12) subject as seen in the previous month, July, on CEMIS.

If new posts are given to a school, or staff resign, school principals enter details relating to the kind of person required to fill the vacant post on a web-based system called **e-Recruit**, which has existed for three years. Twice a year WCED publishes **vacancy lists** on the Web, based on the data received through e-Recruit. Anyone can register as an applicant in e-Recruit and upload their curriculum vitae. The system allows schools to see who has applied for vacant posts. However, WCED retains considerable control over who gets appointed. In particular, WCED will ensure, using various datasets, that educators who have been declared 'in excess', meaning they no longer have a substantive post due to enrolment declines, are prioritised for appointment into vacant posts. Young and newly graduated teachers who received state-funded bursaries are also prioritised.

At the start of each school year, if a school believes it has experienced exceptionally large enrolment growth, it can apply for '**growth posts**', or additional teacher posts[18]. These posts tend to be short-term contract posts. Applications for them occur online.

Where applicable, **teachers are declared 'in excess'** through a manual process within the school, using policies dealing with this. In other words, this process is not automated (nor should it be, presumably).

WCED has for some years used an independent service provider to run **competency-based assessments**, or CBAs, for applicants of **school principal posts**. Recently, heads of department positions at the foundation phase (grades R to 4) have also become subject to these tests. In line with existing policies around the powers of school-governing bodies, WCED must allow schools to choose the weight they place on the results of CBAs when deciding whom they would like to recommend for a management post. However, even if schools decide not to use these results for decision-making, WCED does require all applicants to take the test for monitoring and professional development purposes. Moreover, the test results can influence WCED's final approval of the appointment.

Taking stock of the previous year's Grade 12 results

Starting in January of each year, the approximately 360 public ordinary schools offering Grade 12 receive their previous year's **Grade 12 examination results**. These results inform a number of important discussions around the strategies of the school, discussions which take place between the department and the school, between the school and parents, and between school management and teachers. National reports published on the DBE website provide school-level statistics which have traditionally been important in the South African education discourse: the percentage of learners obtaining the National Senior Certificate (NSC), and the percentage of learners passing key subjects at the minimum 30% pass level. WCED does not

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[18] WCED circular 42 of 2015.

publish through the Web its own school-level results, though the department produces a number of reports on these results which are distributed directly to schools.

A key communication between the department and schools with Grade 12 is in the form of **a school-specific CD** containing examination results in various aggregate forms (though the raw microdata for the school are not included). This CD is made available to schools in January. Many school-specific reports are given to schools, but a few key ones would be the following:

- A one-page **summary report** which includes the numbers of learners entering the examinations, passing the examinations at a basic level (obtaining the NSC), and reaching a 'Bachelors-level pass' permitting the learner to enter a Bachelors programme at a university. The trend over the past three years is shown. This summary report also indicates, per subject, how many learners reached specific mark levels.

- A **question-level report** indicating for each question within a subject how many learners attempted the question, and how far above or below the provincial average mark for that question the learners of the school performed on average. To illustrate what is meant by 'question', in mathematics, details are provided for 22 questions, whilst in English first additional language there are 12 questions. Each question is thus a section of the examination paper, each in turn consisting of several questions. This report allows schools to determine in which specific areas of the curriculum improvements are needed.

Reports which schools receive are used in a number of meetings called by district officials to discuss with school staff how future results can be improved. Schools use the Grade 12 results provided by the department to varying degrees of success. To some extent the problem is the **capacity of school principals** and teachers to interpret performance statistics. But principals and teachers also believe that the **reports could be made more user-friendly and informative**.

Schools would be aware of the widely publicised **awards given to schools** by WCED for schools performing well in the Grade 12 examinations. For example, schools with high pass rates (NSCs achieved divided by Grade 12 candidates), and with large improvements in the pass rate over three years, have for several years received awards. In some cases, awards take the form of non-monetary rewards in the form of, for instance, educational equipment. Monetary rewards, which have existed in the past, have been discontinued.

Awards are also given to schools performing well in the 'systemic tests' applicable in grades 3, 6 and 9 (discussed below). The Grade 12 awards, and those based on the systemic tests are popular amongst some, but have also drawn **criticism**. The awards seem fair in the sense that the criteria for obtaining an award seem clear[19]. However, the argument can be made that schools should be compared to other schools facing similar constraints, in particular as far as the **home backgrounds of learners** are concerned. The need to compare 'apples with apples' is one which many schooling systems grapple with in any programme designed to make judgements about how well or poorly schools perform.

Timetabling and other school management functions

WCED has not promoted specific **school management software** to facilitate processes such as bookkeeping and timetabling. In particular, it has not promoted the SA-SAMS[20] system used widely in the other eight provinces. What software to use, if any, is a decision left up to schools. SA-SAMS, which is downloadable off the Web, has been adopted by a few schools,

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[19] See https://www.westerncape.gov.za/text/2016/January/western_cape_2015_nsc_school_awards.pdf.
[20] South African School Administration and Management System.

but the number is very low. This seems indicative of the problems with the usability of SA-SAMS for school management purposes, as opposed to data submission purposes. The widespread presence of SA-SAMS in the schools of other provinces is largely due to the insistence of provincial departments that SA-SAMS be used for submitting data. For this purpose WCED has developed its own systems, which in many cases have existed for longer than SA-SAMS. Several years ago a provincial school management tool known as **i-SAMS** was developed and then piloted in around 600 schools in the Western Cape. This initiative was dropped, largely because its benefits did not seem to justify its costs.

The submission of the school improvement plan

For a few years CEMIS has included a facility for the online completion of the **school improvement plan**, or SIP. The SIP is an Excel-based document which comes to around six pages when printed out. When schools access the SIP for the new year, it includes pre-populated cells containing historical data carried over from previous collections, cells for the entry of new numbers by the school, and cells for entering some narrative on, for instance, what the school plans to do.

A fairly large number of annual **targets** have to be filled in, spanning three years, the current year and the following two years[21]. To illustrate, a primary school would fill in 66 target values[22]. A secondary school would fill in more, as subject-specific targets for Grade 12 are required. The percentage of learners expected to pass WCED systemic tests, for each of the two subjects (mathematics and language) and for each of the three grades, must be provided. For all grades, the expected enrolment and number of overall passes for three years should be filled in. Targets for teacher and learner absenteeism should also be provided. Though targets are largely determined by schools, there is a formal process whereby school principals and district officials discuss possible adjustments, and both parties sign off on final figures[23]. After this signing off, target values cannot be changed online. Each year principals enter fresh targets for three years. Targets set previously for outer years are thus not carried through.

Apart from targets, schools are required to fill numbers into a few tables relating to current and planned teacher development, the existence of resource management processes, and the existence of various school policies.

The Annual Survey

For many years, the national Annual Survey has taken the form of a survey booklet of, in certain years, over 50 pages, in which schools fill in **statistics on enrolments, staffing, curriculum, facilities**, and so on. The survey includes a **six-page questionnaire which each educator should complete**. This questionnaire includes tables indicating grades and subjects taught, and the teacher's level of confidence and years of experience with respect to specific subjects. Across the country, this survey has increasingly been replaced by the 'harvesting' of data, in particular learner-level data, maintained on an ongoing basis by each school. In the case of Western Cape, the survey draws largely from CEMIS data. However, there are additional statistics which schools must provide each year, in March, so that all Annual Survey questions are answered. For instance, specific online screens capture teacher-specific data required for the teacher questionnaire. Importantly, all educators, whether they are paid by the staff or the school governing body, must fill in the teacher questionnaire. Around 5,000

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[21] A formal provincial policy exists which provides various definitions relating school-level indicators of progress and targets, and stipulates the obligation of schools to provide information. The policy can be found in the provincial government gazette 7399 of 2015.

[22] If targets relating to the Annual National Assessments, currently suspended, were included the tally would increase to 102.

[23] See the 2016 minute at http://wced.school.za/circulars/minutes16/CSminutes/edbs1_16.html.

of the province's approximately 33,000 public schools-based educators are employed by the school governing body. The number of public schools with such educators is around 850.

Quarterly monitoring processes

After the end of each of the four school terms, **aggregate results for all grades** are submitted by schools to the department through a recently introduced spreadsheet tool referred to as **Recording and Reporting**, which is downloaded and uploaded though CEMIS[24]. Statistics submitted through this tool would be, for instance, the number of Grade 4 social sciences learners with a mark falling into the lowest of seven mark categories. The school principal would then see these statistics in reports produced by, for instance, the district where comparisons across terms, across schools, and between actuals and targets are made.

CEMIS does also permit and require the entry of more **detailed learner- and subject level assessment statistics** on a quarterly basis, for grades 1 to 9. This was confirmed in the interviews with school staff, who also reported that an advantage with this process is that CEMIS calculates aggregate assessment results per learner, using the relevant formulas. However, once in CEMIS, the data are aggregated and in fact the original raw data are lost. This is why, for instance, schools cannot pick up, through CEMIS, the historical assessment record of a learner arriving as a transfer from another school. In order to preserve individual records, what many schools do is that they store the original raw data on spreadsheets outside of CEMIS.

Some schools do complain about the **level of effort** involved in submitting the assessment data. More advantaged schools have in some cases argued that they have their own tracking systems and would prefer to use only these. Some less advantaged schools have complained that lack of familiarity with computerised tools plus slow internet speeds, make the process cumbersome.

Schools must also on a quarterly basis submit other information to the department, through CEMIS, relating to matters such as the **availability of books**, and the **use of public funds**. This occurs through a facility known as School Improvement Monitoring, or SIM[25]. Previously, schools had been required to submit information, via SIM, on how far teachers were in the annual curriculum programme, or their degree of '**curriculum coverage**'. However this requirement was dropped in response to scepticism that reporting added value to the schooling process. This discontinuation is worth noting. Considerable support has been expressed in South Africa for a more systematic monitoring of curriculum coverage in schools. Whilst such monitoring may appear sensible, it is technically difficult to accomplish, there are few models from other countries to follow, and the monitoring can have the perverse effect of unnecessary micro-management where teachers do a good job, and an undesirable 'tickbox response' in the case of weaker teachers. The alternative of paying better attention to learning outcomes at critical points in the year, as opposed to monitoring the actual week-by-week coverage of curriculum topics, is in several respects preferable (though of course the two are not mutually exclusive).

An online facility that is separate from SIM, known as the Cash Book System, is available for some schools to submit data relating to the financial allocation to the school, including confirmation that funds have been received. Schools which are not on this system yet have to submit the required financial information through paper reports[26].

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[24] See WCED circular 13 of 2015.
[25] See WCED 'business strategy and stakeholder management' minute 1 of 2016.
[26] WCED circular 2 of 2015.

Performance management of staff

The national performance management system for educators, currently referred to as the Integrated Quality Management System, or **IQMS**, requires educators to rate themselves, and be rated by their managers, with respect to various performance criteria. There are four rating levels: (1) unacceptable; (2) meets minimum requirements, (3) good and (4) outstanding. The data from this process are important in part because educators with a final rating of 'unacceptable' are excluded from the annual salary notch increment. In Western Cape in recent years around 1 in 193 teachers have been rated as 'unacceptable'. The figure for all other provinces combined is 1 in 288. Whilst these numbers may seem low, they are arguably sufficient to serve as a deterrent. Moreover, the IQMS is relatively well implemented in Western Cape if one considers that in recent years only around 5% of teachers find themselves in schools where everyone receives the same rating (of the four possible ratings). Around 30% of teachers find themselves in schools where there is a mix of three or four ratings. For the other eight provinces combined, the figures are 15% for just one rating and 25% for three or four ratings, reflecting less within-school variation in IQMS scores[27]. The more variation there is within schools, the greater the chances that the IQMS is being used properly to differentiate between the performance of teachers, and to acknowledge that some teachers need more support than others.

Western Cape schools currently submit **data on IQMS ratings** in a fairly unsystematic manner, for instance through e-mails and Excel spreadsheets. For salary purposes, the only critical information is which educators received the lowest rating, below 'satisfactory'.

The **South African Council for Educators**, **SACE**, has for some years been maintaining a system whereby educators submit, through SACE's online system, what professional development activities they have been engaged in. This system is partly designed to encourage educators to put in the minimum stipulated level of effort, in terms of hours and points, with respect to ongoing professional development. The system, called the **Continuing Professional Teacher Development** system, or **CPTD**, has been used only by educators in the rank of schools-based head of department or above. However, in 2016 all teachers were expected to begin participating in the system.

Systemic tests in the fourth term

A crucial system which has existed since 2002, and is unique to the Western Cape, is a programme of '**systemic tests**' administered in **grades 3, 6 and 9**. At the start of the fourth term, so in October, over a period of ten days contracted test administrators from outside the school come to schools with tests in mathematics and languages, administer the tests to all learners in the affected grades, and leave the school with the tests. Each school experiences all its testing on one day. In all three tested grades, tests are available in English and Afrikaans, and in Grade 3 they are also available in isiXhosa[28]. Tests consist of a mix of multiple-choice questions and open-ended questions.

In the first week of the following school year, **schools receive reports** on how well they have performed in the systemic tests. There is a separate report for each grade. To illustrate, the Grade 3 report consists of nine pages, with statistics represented to a large degree in graphs, but then also repeated in tables. Aggregates are provided per subject in the form of the average percentage score and the percentage of learners achieving above the pass threshold, which is considered to be a score of 50%. Trends across four years are provided. Results are

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[27] These statistics are calculated from the microdata collected for Department of Basic Education (2012).

[28] There is not much information on the WCED website about what the systemic tests aim to test, but test exemplars are available at http://wced.school.za/home/service/litnumtests.html.

broken down by the level of difficulty of questions, in terms of school grade. Thus it is possible for a school to see, for instance, what percentage of its Grade 3 learners obtain at least 50% in questions testing abilities Grade 1 learners should have. The distribution of the school's learners across bands of performance, each consisting of 10 percentage points, is given. Performance in each of five Grade 3 mathematics curriculum content areas, and three areas in the case of language, is illustrated, and the trend for this over three years is also provided.

In all, the reports provided to schools seem comprehensive. When compared to similar reports in other countries, the key gap that emerges in the Western Cape reports is an absence of **performance benchmarks derived from similar schools** (this is the 'apples to apples' problem referred to above). This makes it difficult for a school to determine whether it is performing as well as one might expect. The only comparison included in the department's report is in the form of a few comparisons to provincial averages.

Reports are **not made publicly available**, for instance through the WCED website. Here different schooling systems take different approaches, with some making reports very easily available (Brazil and Chile) and some adopting the more 'below the radar' approach of Western Cape (for instance Uruguay). There are advantages and disadvantages with either approach. In the case of Western Cape, the official rationale is that by not publicising 'school report cards' widely, the province avoids unhealthy and very public 'naming and shaming', and instead allows professionals to propose the right interventions for specific schools. In the South African context of considerable freedom when it comes to deciding which school to send one's child to (essentially the absence of rigid zoning rules across all areas), if the systemic test results were widely available in 'league tables' of schools, disruptive changes to the enrolments of schools could occur. Returning to the matter of socio-economic status, a key reason why school-level test results could be misinterpreted if they were made widely available is precisely because inappropriate comparisons would be made across schools. People would not compare schools with similar circumstances.

The **results of individual learners** are *not* communicated to schools, the rationale being that the testing system is primarily aimed at assessing the schooling system and schools, not individual learners. However, **aggregates at the level of the class** (so at one level below the grade) are made available to schools, though not within the formal report referred to above. Class-level statistics are likely to be informative when it comes to, for instance, determining which teachers need additional support.

Arguments, especially by teachers and their organisations, that there is **too much assessment and testing** are repeatedly made, in South Africa and virtually all countries where freedom of expression exists. How serious is this tension in the Western Cape? Though teacher unions, in particular SADTU[29], have called for less standardised assessment, and in 2016 have specifically called for the halting of Western Cape's systemic tests, there does not appear to be a deeply-rooted and widespread opposition to standardised assessment amongst Western Cape's teachers. In fact, as mentioned above, the systemic tests programme is amongst the most valued WCED initiatives according to the customer satisfaction survey, whose respondents would be mainly teachers. Yet some dissatisfaction with the systemic tests does exist and should be carefully noted by planners. In particular, school principals and teachers believe they are too often unfairly judged by officials on the basis of their systemic test results. This complaint has a number of facets. On the one hand there is an impression that though the test results should produce information on where the problems lie, and how to solve them, the emphasis tends to rest mainly on the former (the problem, and who is to blame), and not the latter (the solution). On the other hand, it seems schools do not like being

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[29] South African Democratic Teachers Union.

compared in simplistic ways to other schools which do not face similarly difficult obstacles (such as home background difficulties amongst learners).

The conducting of the Grade 12 examinations

The Grade 12 examinations occur during October and November. Schools themselves are not involved in the marking of these examinations, though teachers from a school may be recruited by the department for this process, which occurs at one of WCED's marking centres. The results of individual learners are communicated in January of the following year through a variety of media, including SMSs and the Web. In February to March of the following year supplementary examinations are written at schools by learners who were absent for year-end examinations or want to improve their marks. Obviously the reports WCED provides schools at the start of the year do not take into account changes in the school's results brought about by the supplementary examinations. To provide an idea of the difference, in Western Cape the supplementary examinations have in recent years raised the number of learners obtaining the NSC by around 2.0%[30].

The closing of the school's financial year

31 December is the end of the school's financial year. Virtually **all schools receive some public funds transferred into their bank accounts** and many also receive funds from private sources. Though the approximately 900 'no fee' schools cannot charge school fees, they may receive other private income in the form of, for instance, donations. Financial accounting is considerably more complex and labour-intensive in schools which charge school fees as payments are often made on a monthly basis and non-payment and fee exemptions must be managed. How schools do their financial accounting is dealt with by the South African Schools Act (SASA). Schools thus fall outside the ambit of the Public Finance Management Act (PFMA), which covers government in general. Over the years, relatively good financial management manuals directed at schools have been developed, and a standard chart of account for schools exists. Annual audited financial statements, a requirement in terms of SASA, are sent in paper form to district offices, which then file these statements. Districts may scrutinise the statements, but this seldom happens.

The school's physical infrastructure

Schools are expected to spend 5% of their school allocation on the maintenance of physical infrastructure. However, this rule is widely flouted in the context of pressures to spend on other items. WCED therefore combats the deterioration of school buildings through a centrally-run system of '**scheduled maintenance**'. In addition, WCED responds to emergency infrastructure situations. A school is likely to be informed by the district when a project it benefits from is about to commence, but comprehensive lists on the Web spanning several years of projects across all schools are not easy to obtain.

With regard to physical infrastructure, but also other matters, there appears to be **a culture of responsiveness** in WCED. Officials generally respond to correspondence from school principals in helpful ways. This is considered positive by school principals, partly as this is seen as better than what is found in the rest of the public service.

5.2   Grade 12 examinations

Grade 12 examinations data are warehoused in a **mature system** managed by the State Information Technology Agency (SITA). There appear to be no major problems around data

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[30] Department of Basic Education, 2015: 9.

entry processes and the extraction of reports or microdata from the system[31]. The least automated data collection process relating to the Grade 12 examinations is the gathering of the '**school-based assessment**' (SBA) results of individual learners, which count for a portion of the examination candidate's final mark[32]. These SBA results are entered by schools into reports and are then re-captured by office staff into the examinations mainframe system.

The examinations section in WCED produces a variety of reports partly aimed at informing schools and districts of where the areas of weakness lie. **Within a single year** the Grade 12 data are able to provide a relatively good idea of which schools and which subjects within schools require special attention (though, as discussed in section 5.1, the fact that results are in general not viewed in terms of socio-economic circumstances is a gap).

However, the Grade 12 results, at least at face value, provide rather **unreliable trends over time** to gauge, for instance, whether individual schools are getting better. This unreliability, which is due to factors such as changing levels of difficulty in the examinations, changing pre-Grade 12 drop-out patterns and changes in the subject choices of learners, is acknowledged in WCED's reports[33].

WCED has attempted to analyse the extent to which drop-out patterns between grades 10 and 12 have changed. The method for getting one year's value used by WCED[34] involves dividing, say, the number of Grade 12 examination candidates in 2014 by the number of Grade 10 learners two years previously, in 2012[35]. This approach is likely to lead to misleading statistics for a number of reasons. Firstly, by including Grade 10 repeaters in the denominator, as is done by WCED, one is **over-stating the retention problem**. Grade 10 repetition is high. A 2015 Stellenbosch University report commissioned by WCED[36] indicates that 23% of Grade 10 learners in 2011 repeated that grade the next year. To illustrate the extent of the over-statement of the problem, where WCED's analysis in its 2015 annual report says 64% of learners stayed in school between Grade 10 in 2012 and Grade 12 in 2014, this figure should in fact be roughly 84%, if Grade 10 repeaters were to be excluded from the denominator. WCED's data in fact allow for a more accurate method, which is discussed in section 5.4 below. It should be added that this monitoring challenge has not been adequately dealt with by any of the provincial departments, or the national department. A report forming part of the same project as the current report explores solutions to these analytical questions.

A noteworthy pilot programme being run in 41 secondary schools in Western Cape is the **Target Programme**. This programme, funded by the Michael and Susan Dell Foundation, involves coming up with better measures of school performance, for instance in terms of Grade 12 outcomes, and then to examine the impact of monetary rewards given to schools which achieve sufficient improvements[37]. This kind of experimentation is important. The programme involves expressing Grade 12 outcomes in terms of earlier enrolment levels (specifically in Grade 9). The fact that grade repetition is not taken into account does raise the

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[31] One noteworthy issue seen in the Western Cape examinations data within the national database relates to the 13-digit national identity (ID) number. This number is more likely to be invalid in Western Cape than in other provinces. See statistics in this regard in the KwaZulu-Natal report. This matter was discussed with a few people working in this area and it appears as if it is a data capturing problem occurring during the examinations registration process.
[32] SBA is said to count for 25% of a learner's final mark in a typical subject. However, due to a complex system of secondary weightings the final weight of SBA is in fact much lower than 25%.
[33] Western Cape Government: Department of Education, 2015: 36.
[34] Western Cape Government: Department of Education, 2015: 49. The analysis is also presented in WCED's four-page *Citizen's Report* for 2014-2015, available on the WCED website.
[35] The method is not fully explained in WCED's reports, but some simulation with enrolment totals over the years confirms that the Grade 12 total was divided by the Grade 10 total.
[36] Van der Berg *et al,* 2015: 17.
[37] Access was obtained to a non-published project report.

risk that schools could over some years manipulate indicator values by simply reducing grade repetition in an earlier year. This may not be entirely undesirable, but clearly this is a complexity that would have to be taken into account (this is of course related to the monitoring of retention issue discussed in the previous paragraph). Moreover, when targets focussing on Grade 12 passes are used (as is the case in the Target Programme), the possibility that schools will manipulate results by changing the subject choices of learners in undesirable ways should also be considered.

What seems valuable is the fact that WCED's reports (described in section 5.1) prepared for schools following the year-end examinations include tables indicating the **distribution of the performance of learners across mark categories** (one such category being for instance 60% to 69%). Nationally, much of the conversation around performance in specific Grade 12 subjects revolves around passing at the basic 30% level, but then also the number of distinctions, meaning a mark of 80% or higher. In terms of the opportunities for learners after school, the truly important subject-specific thresholds are often 50%, 60% or 70%, thresholds which are obtainable by substantial numbers of learners (few learners obtain distinctions) and will permit learners entry into specific university programmes. WCED's reports directed to schools do allow monitoring at this crucial level. What could be stronger, however, is reporting on this in the public accountability reports, in particular the annual report and WCED's *Citizen's Report*. Whilst these reports do refer to statistics on learners achieving a Bachelors-level Grade 12 pass, there is very little emphasis on better achievement in specific subjects. Here subjects such as **mathematics and physical science** are of special importance as insufficient achievement here lies behind serious skills shortages in the labour market.

The data capturing of marks for specific questions within each subject and for all learners seems unique to Western Cape. As discussed previously, these data allow WCED to provide more in-depth advice to schools on what to focus on. However, what WCED is doing should not be confused with what assessment experts would refer to as the generation of *item-level data*. Such data would have mark details at the lowest possible level in the examination, whilst WCED's data describes achievement with respect to clusters of low-level question, hence there are for instance 11 values for each mathematics examination. Capturing data at the lowest question level would clearly be a relatively costly exercise. The most cost-effective approach here would probably be to capture these data for a representative sample of learners.

A key gap in the Western Cape system (but also nationally) is that changes to performance statistics brought about by the **supplementary examinations** following the year-end examinations are generally not taken into account[38]. It is understandable that for reasons of timing, reports to schools on their previous year's performance would not include post-supplementary results, but what is not justifiable is that long-range trends nearly always exclude the impact of supplementary examinations (as explained in section 5.1, supplementary results raise the number of passes by around 2.0%). Perhaps more seriously, in Western Cape (and across the country) the success rates of **part-time NSC candidates** are not properly monitored. In Western Cape, 17% of examination candidates are part-time students, or around 11,000 of 68,000 youths[39]. These students tend to be socially particularly vulnerable. In recent years, the great majority of these students in the Western Cape have been writing their examinations at a school[40]. Whilst statistics on how many part-time students pass specific subjects in an annual cycle are available, what is not available is numbers on how many part-time students get to obtain the NSC. The information could be extracted from the available examinations data, but it would involve combining results over several years, and

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[38] Some comparison of Western Cape Government: Department of Education (2015: 36) to remarks made about post-supplementary results in the previous year's annual report confirms that *pre-*supplementary results are used to gauge long-range trends.
[39] Department of Basic Education, 2016: 18.
[40] Department of Basic Education, 2013: 18.

standard reports for this do not seem to exist. Better reporting on post-supplementary results and achievement of the NSC by part-time student would produce more comprehensive and accurate statistics.

Way forward

To sum up, WCED appears to be **highly successful** in playing its role in maintaining a national examination system which fulfils its prime purpose, namely to assess individual learners and provide them with qualifications. WCED is also experienced at accessing the examinations data and providing them to schools and districts in a variety of formats, the aim being to assist in the management of educational improvement.

However, there are many ways in which the use of the Grade 12 examinations data for **monitoring systemic and school-level progress could be enhanced**. The work going forward should involve better use of the examination results of full-time learners, but also enrolment data across various grades to determine survival to Grade 12 – here the separate report accompanying the current report should assist. Moreover, further work is needed on the data on **part-time students** and on the generation of better measures of the **socio-economic contexts** of schools – these are matters the separate report will not deal with.

One measure of the socio-economic status (SES) of schools which, though not ideal, is likely to facilitate somewhat better comparisons of results across schools, is the **average fee income per learner**. The necessary data would be easy to obtain. Clearly a major drawback with this approach is that it would not allow for differentiation amongst the 900 schools which do not charge fees.

5.3   Pre-Grade 12 assessments

WCED's '**systemic testing**' programme for grades 3, 6 and 9 is a particularly important and innovative initiative which has received far less attention than it should in the South African education discourse. This is partly because WCED has deliberately attempted, for justifiable reasons, not to make the testing system a highly publicised high-stakes system. But this is also partly because the understanding within South Africa of the strategic importance of these kinds of standardised testing systems is arguably not fully appreciated. Without such systems it becomes almost impossible to assess whether the outcomes of the schooling system are improving, and how large any improvements are. And without a clear idea of improvements, there is a risk that good general strategies could be stopped, simply because it is not clear that improvements are occurring, or that mediocre strategies will be permitted to continue.

The testing occurring in schools and described in section 5.1 is undertaken by **two different external service providers**. One service provider develops the tests, following specifications provided by WCED. A second service provider then administers the tests, using teams of test administrators, marks the tests, and produces a summary report and a final dataset for WCED[41]. WCED then uses the final dataset to produce the school report cards described in section 5.1. A key reason why much work is done by external agents is that WCED is interested in a testing process that is impartial. If WCED itself ran the testing system it could be argued that WCED is both the 'player and referee' insofar as it delivered education services and assessed the quality of these services. A further reason for outsourcing the work is the fact that it is concentrated in a few weeks of the year, meaning an exceptional volume of labour is needed during just these weeks. Moreover, there was an interest in not over-burdening teachers with additional tests and marking. The rationale for having two service

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[41] In recent years the first service provider has been Centre for Evaluation and Assessment (CEA) at the University of Pretoria, whilst the second service provider has been a team drawing from the Schools Development Unit (SDU) at the University of Cape Town and Pearson South Africa.

providers, with one dealing with test design, is that this improves the accountability around the test design process. Had just one service provider done everything, there would a risk that poor test design could be covered up in the subsequent marking and reporting stages.

The systemic tests are underpinned by a **considerable bureaucracy of policies, rules and tools**. Apart from specifications directed at the service providers, necessary documents include instructions to guide test administrators, instructions to schools regarding actions to be taken on the test days, forms to report irregularities such as suspected cheating, protocols governing security at the provincial marking centre, and so on. Tests are largely the same from one year to the next, so security is a high priority. It seems as if there have never been any major leaks of tests. This is a considerable achievement, considering how extensive the testing programme is.

Some test **questions are 'retired'** each year and replaced with other ones. These retired questions are used in **exemplar tests** available on the WCED website.

The deliberate inclusion of questions in each test which would normally be used at a *lower* grade, as in Grade 1 questions appearing in the Grade 3 test, can be considered a valuable element of the programme. The large gap between **what the curriculum expects learners to do**, and **what learners are actually capable of doing**, in particular in developing countries, is increasingly being seen as a policy challenge. There are no easy solutions, but at least knowing how far behind learners are, by including 'easy questions', at least assists in assessing the size of the gap.

It is noteworthy that WCED's systemic tests programme **has taken many years to develop**, and involved considerable trial and error. This would partly be because WCED was initiating this programme when the knowledge globally about best practices in standardised testing, in particular within a developing country context, was still weak. What has been particularly laborious and costly has been the work around the development and piloting of appropriate questions, with sufficient comparability across the three languages, and the building up of '**item banks**' (databases of questions, each carrying specific classifications with respect to level of difficulty, alignment to the curriculum, and so on).

Whether Western Cape should keep the programme in its current form is a question that is often raised, in particular in recent years given worsening budget constraints. The programme currently costs **around R40 million a year**. This works out to R38 per learner[42], or 0.3% of WCED's total budget. This does not seem a high price to pay if one considers that without this programme the ability of WCED to gauge whether **the remaining 99.7% of the budget** was being spent in a manner that improved the learning outcomes of children, would be severely compromised.

What seems an important next step for WCED is to ensure that at least *system-level information* from the systemic tests becomes more widely available and discussed. This would not compromise WCED's commitment to not releasing *school-level* results publicly. Releasing publicly system-level information, including technical details about the testing programme, would bring about desirable accountability pressure within WCED to ensure that testing processes are credible, and in particular that results are sufficiently comparable across years. But making this information public would also assist in educating stakeholders about the features but also the purpose and importance of the programme. In short, it would be easier to justify continued spending on the programme.

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[42] The denominator here is all learners, not just tested learners, which is appropriate given that the testing programme is meant to gauge the quality of system as a whole.

There is in fact very little system-level information that is made available through WCED's website, or through any other means, apart from a few figures included in the WCED annual reports. Two vital reports produced annually (and published on the Web) by **Australia's National Assessment Programme** (NAP) serve as a useful benchmark for what WCED could make publicly available. Clearly Australia has far more resources for this work than Western Cape, yet the Australian work offers at least a menu of possible next steps for Western Cape (and South Africa generally).

The first NAP report describes quality trends in the schooling system[43]. It provides average test scores for different grades and subjects over several years. In fact, WCED's second service provider does produce reports of this nature, but they are not published[44]. There is one critical difference between the Australian report and the WCED report. The latter makes **no reference to standard deviations**, an omission that makes the interpretation of trends difficult (as explained below).

The second NAP report is a **technical report** describing the methods used in the Australian testing system[45]. It is partly meant to assure stakeholders that best practices have been followed and that statistics are sufficiently comparable over time. This report (around 100 pages, but with 500 pages of appendices) explains, for instance, the degree to which item-level scoring data supports the validity of the questions used in the tests and how marks in a year were adjusted, using anchor items, to make scores comparable across years.

Technical reports of this nature are produced by WCED's second service provider and one of them was examined by the authors of the current report[46]. This latter report confirms that marks given to schools and aggregate marks published in the annual reports are **classical scores**, for instance 62% where this means the mark obtained by the learner divided by the total possible marks in the test. This is unlike the Australian system or other highly developed testing systems (such as TIMSS[47]), where instead of a classical score, a score per learner based on **item response theory** (**IRT**) is generated. One can think of this latter score as an adjusted score, where adjustments ensure that changes in items (questions) from one year to the next do not unduly influence the comparability of results over time. In Australia, what has become the standard approach for IRT scores is followed insofar as the whole scoring system for a specific test makes the average score in a past baseline year equal to 500, and makes 100 equal to a learner-level standard deviation in the baseline year. The WCED service provider does in fact apply a **Rasch analysis**, a method drawing from IRT, in order to check the comparability of the classical scores over time and the conclusion is drawn that the classical scores are sufficiently comparable. An obvious question is why WCED does not use IRT (or Rasch) scores in communicating results to schools, and in reporting system-level trends over time. Such scores would undoubtedly improve the comparability of the statistics. One advantage with classical scores (such as '62% in mathematics') is that they are traditional and widely understood. This seems to be one of the justifications currently for not giving schools IRT scores. Perhaps a first next step would be to at least use IRT scores to report on system-level progress in the annual reports, partly so that the degree to which the classical score aggregates are not comparable can be made explicit. Whilst this might increase the risk of confusing stakeholders with an excess of technical information, **WCED as a pioneer in this area** can play an important role in raising the level of the debate in the area of assessments, amongst South African policymakers and academics.

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[43] Australian Curriculum, Assessment and Reporting Authority, 2015a.
[44] See for instance Western Cape Government: Department of Education (2014).
[45] Australian Curriculum, Assessment and Reporting Authority, 2015b.
[46] Western Cape Government: Department of Education, 2015b.
[47] Trends in International Mathematics and Science Study.

What should a **discussion of educational progress**, or the 'bottom line' of WCED's 'business', ideally include, and why are standard deviations important? Traditionally, expert opinion has been used to determine whether an improvement from, say, a mean of 47% to 56% in a test over four years represents a good, or even impressive improvement. Over the last twenty or so years far more rigorous methods have been devised to gauge how good an improvement is and to compare improvements across different countries and testing systems. A widely used metric today is improvement in terms of a standard deviation. The standard deviation is essentially a measure of the degree of inequality amongst learners with respect to test results. This in turn depends partly on how good a test is at distinguishing between better and worse performing learners. **Improvements *for an entire system* over one year**, where that system is improving quickly, tend to be around one-twentieth of a standard deviation, so **0.05 of a standard deviation**[48]. The 2015 University of Stellenbosch analysis (commissioned by WCED)[49] of various WCED systemic test datasets indicates that in Grade 3 mathematics, the standard deviation is around 24 percentage points. If we take 0.05 of this we get 1.2. If the average mark for Grade 3 mathematics improved by 1.2 marks (out of 100) per year, that would be excellent. In fact, between 2011 and 2014 the average mark for this grade and subject improved by 5.7 marks[50], so by 1.9 per year if we divide by three years. This is truly excellent. Some might argue this improvement is too large (too far above the 1.2 threshold) to be believable, but this is probably debatable. This description is provided to illustrate the types of checks and explanations which ought to be built into WCED's narrative around progress in order to strengthen its arguments, verify its data, and ultimately improve education planning.

Further matters which could be considered in WCED's interpretation of the systemic test results would be the effects of '**teaching to the test**'. This effect is inevitable in any standardised testing programme, and is likely to be largest when the testing programme is new (which is no longer the case in Western Cape). Whether schools are keeping weaker learners away from schools on testing days to boost average results could also be explicitly considered. One report indicates that **absenteeism** on a test day is as low as 3.5% across all schools[51]. This does not seem problematic, but whether there are noteworthy school-level exceptions could be queried using the available data.

The complaint made by many teachers that the systemic tests data are not used to **produce information that can help them improve their teaching** seems highly relevant. The implication is that WCED should ideally be producing reports, or guides, drawing from the data, over and above what has been mentioned above. This is not that easy. In Australia, an official inquiry into the effectiveness of NAP resulted in the recommendation that NAP data be used to a greater degree to 'assist the Government to deliver extra, targeted funding to schools and students who need more support, rather than the development of league tables'[52]. The response by the authorities seemed weak, suggesting that that there is no clear idea of how results should be used to foster support and development. Effective data use in this area is not strongly visible on the websites of testing programmes in countries other than Australia. One interesting resource is PISA's[53] *Ten questions for mathematics teachers*, which uses data for answering questions teachers often ask about teaching methods[54]. PISA's report, however,

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[48] See Hanushek and Woessman (2007: 44). The authors' value of 0.5 was divided by 10 years, the shortest possible period according to the authors. See also Gustafsson (2014: 136).

[49] See Van der Berg *et al* (2015), specifically Table 3.4. The standard deviation quoted here was for Grade 3 mathematics in 2008 (the figure in the report is 23.88). Using a value for one year is unlikely to be a problem as standard deviations in these kinds of tests tend to change very slowly over time.

[50] Western Cape Government: Department of Education, 2014a: 7.

[51] Western Cape Government: Department of Education, 2014a: 6.

[52] Australian Government, 2014: 7.

[53] Programme for International Student Assessment.

[54] OECD, 2016.

draws from both the test results data and background questionnaire data. WCED's systemic tests programme does not include background questionnaires directed at learners and teachers.

From 2011 to 2014, the **Annual National Assessments** (ANA) programme was run. This national programme involved the testing of all learners in grades 1 to 6, with the scope being widened to include Grade 9 from 2012. Tests were marked mostly at schools. ANA included a very ambitious data collection element. Learners were registered before the testing, and after testing aggregates per learner and subject (language and mathematics) were captured by provinces and fed into a national database. Data capture procedures were similar to those applicable to the Grade 12 examinations. In 2015 ANA was temporarily suspended largely due to teacher union opposition to the programme, whose purpose was said not to be sufficiently clear. Western Cape was the only province which ran a fully-fledged provincial testing system (the systemic tests) whilst also conducting ANA.

The attention now shifts to a matter emphasised within many WCED monitoring reports, namely **the pass rate into the next grade**. This pass rate would depend on grades 4 to 11 examinations, as well as tests in grades 1 to 11, all of which are to a large degree designed by schools. By definition, a learner who does not pass is made to repeat the same grade. The Stellenbosch University report[55]:

> It is … worrying that the systemic tests are so poorly correlated with repetition. This may indicate that assessment practices are weak at school level. Further attention is needed to ascertain to what extent that is the case and to put corrective measures in place. … repetition is one of the major factors determining dropout, and it is therefore important that decisions about repetition are based on solid evidence.

Earlier research by Lam, Ardington and Leibbrandt (2011), using household data from Cape Town, had also concluded that **who gets to repeat a grade is in certain respects a bit of a 'lottery'**. Moreover, that research had concluded that the problem was particularly acute in historically black African schools.

Very importantly, a weak correlation across the system between learner scores in WCED's systemic tests and being promoted to the next grade is likely to be the outcome of two rather distinct problems. Firstly, **teachers may not be good at designing assessment instruments** which successfully differentiate between learners who should be promoted and those who should repeat. The response here should be capacity building in the design of assessments. Secondly, even if teachers are good at designing assessments, **schools may apply different standards** when deciding who repeats a grade. This problem would also cause the poor correlation referred to above. Here the solution would need to be better guidance on what standards to apply. It is unlikely that different schools will set exactly the same standards, given that assessment is largely managed by schools, but differences across schools should not be excessive. The magnitude of each of the two problems should be established, so that the right mix of intervention strategies can be pursued. This knowledge is fairly easily obtainable through a closer examination of the degree to which weak correlations between systemic tests and grade repetition exist *within* schools.

Way forward

WCED's systemic tests programme is a national asset which has been under-valued and not been sufficiently scrutinised. It ought to continue. Its cost is not high relative to WCED's overall budget and relative to the crucial information it provides, at the level of schools and the system. Moreover, it provides information that a future national assessments programme will not provide, it seems, at least in the foreseeable future. (Current proposals for a

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[55] Van der Berg *et al*, 2015: 3-4.

redesigned ANA seem to specify a rigorous sample-based testing component to gauge systemic progress, running parallel to universal testing that would be administered and marked by teachers themselves. Whilst this can add value, it would not do what WCED's systemic tests do, which is to provide fully independent monitoring across all schools, with virtually no possibility of 'gaming' by schools.) The challenge for WCED lies largely in strengthening further test design and, in particular, the marking and marks adjustment process with a view to bringing about **greater certainty over the year-on-year comparability of marks**. WCED should over time become more transparent about its processes, in line with best practices around the world, and partly as a way of raising the status of the programme. It is worth noting that methodologies for standardised testing are evolving and that even the most advanced systems in the world attract criticism. This is healthy and should be seen as part of the development process.

The concerns of some WCED officials that **very suddenly opening the entire programme to public scrutiny could be counter-productive** are concerns that must be considered. In a context of limited understandings around the technical aspects of standardised testing systems, there is a risk that the systemic tests programme could become more a 'political football' than a topic of serious technical debate. Given these concerns, a first next step should probably be for the programme to be opened to the scrutiny of a reference group of experts, from Western Cape and beyond. This group could help determine what aspects of the programme should become more public, and when.

Once the **ANA programme** is restarted, WCED is likely once again to have to defend the continuation of the systemic tests rather vigorously. In particular, WCED will have to be clear on how the systemic tests and ANA are different, and on what would be lost were the systemic tests stopped. In all likelihood, ANA will evolve and eventually there may no longer be a need for WCED's provincial tests. WCED should be explicit about what ANA would need to do for this point to be reached.

With respect to promotions from one grade to the next, WCED has a rich set of data which can be used to establish the exact nature of what seems like a serious problem, namely a weak correlation between the systemic tests and a learner's likelihood of repeating a grade. The extent to which this is about **differing standards in different schools** (a less serious problem) and the extent to which this is about **weak assessment practices generally** (a much more serious problem) should be established using the available data.

5.4   Learner participation data

CEMIS, or the **Central Education Management Information System**, when introduced in 2005 created a vital tool for monitoring learners[56]. It has since served as a core system around which several other systems have grown. CEMIS, like all the provincial data systems used by WCED, is maintained and, when necessary, enhanced by technical staff based at the **Centre for e-Innovation** (**CEI**) falling under the Premier's Office. CEI's work is crucial for WCED's data. WCED officials are generally very satisfied with the services of CEI. Given how difficult it can be for one government department to serve another one successfully, in the context of the inevitability of at least some bureaucracy, and given difficulties specifically related to delivering information technology services (for instance skills shortfalls in this area), CEI represents a significant achievement in Western Cape[57].

To some extent CEI has worked with the national **State Information Technology Agency**, **SITA**. However, CEI does to a fairly large extent provide services that should arguably be

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[56] See http://wced.school.za/circulars/minutes05/eer2_05.html.
[57] The CEI's 2004 strategy includes a number of rather standard but important priorities – see https://www.westerncape.gov.za/other/2004/8/cei_strategy_v1_aug04.pdf.

provided by SITA. In other provinces (and in the national DBE) one is likely to see a stronger dependence on SITA. This dependency has not been without problems as SITA is often seen to be costly and overly bureaucratic[58], whilst policies and strategies do not allow education departments to make use of other providers (the degree to which this holds true varies by province). Clearly, any attempts to replicate systems used in Western Cape in other provinces would have to include careful consideration of the nature of the working relationship with SITA, and whether alternatives are possible.

On the whole, **WCED's officials are satisfied** that the various elements of CEMIS function well. Despite some concerns raised by the Auditor-General around the veracity of daily learner attendance records, it seems this aspect of the system adequately serves its accountability and monitoring purposes.

Officials are relatively satisfied with the maintenance of unique learner identifiers, which are crucial for preventing the double-counting of the same learner within a year and also for tracking year-on-year grade promotion, repetition and dropping out. However, here there are noteworthy problems which require fixing. The Stellenbosch University report commissioned by WCED refers to **the possibility of high levels of dropping out** at the primary level, for instance a drop-out rate of 16% at the primary school level. But this report also refers to the possibility that learner unique identifiers change, resulting in apparent dropping out which is not real[59]. Statistics South Africa figures on enrolment levels in Western Cape indicate that high levels of dropping out cannot be real[60], and that the explanation must lie with changing learner identifiers. A new analysis of Western Cape's learner records in Appendix A of the current report supports this conclusion. The fact that this problem is not better understood seems to have arisen because CEMIS learner data are not used regularly and systematically to track dropping out. Clearly some dropping out does occur, and one reason a schooling system would maintain a database of individual learners is so that dropout 'hotspots' in the system could be identified. By 'hotspots' is meant schools or clusters of schools where early dropping out is particularly prevalent. In the case of Western Cape, this is probably most likely to happen in rural areas.

An analysis of the national dataset of learner records, **LURITS**[61], which in the case of Western Cape draws from CEMIS, reveals a few interesting patterns which suggest that despite its problems, **CEMIS is at a relatively advanced stage**. In Western Cape in 2014, 97% of learners in grades 2 to 12, in public or independent schools, could be found in 2013 using the learner's unique identifier. The national figure was 64% and Free State, the best province after Western Cape, displayed a figure of 90%.

Officials at WCED's head office report that **district offices have limited capacity** to process and analyse microdata, whether CEMIS learner-level data or other microdata. This is likely to change with the recent appointment of management information system (MIS) officers in all districts. An argument that is often made strongly in the literature is that a priority should be to make data widely accessible to managers at all levels, for instance through online data-querying facilities and so-called dashboards, so that these managers can use data in innovative ways that meet their requirements. WCED's priority, it seems, has rather been to promote **innovation at the centre**, in other words at the WCED head office, and then to allow district and school managers to use the resultant systems in a relatively standard manner. Whether this has been the optimal approach, and whether it would be optimal for other education systems, is a complex and debatable matter. Yet it remains noteworthy that WCED has clearly

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[58] SITA's 2014 annual review is in fact candid about the seriousness of the efficiency problems of the organisation (State Information Technology Agency, 2014: 22).
[59] Van der Berg *et al*, 2015: 13.
[60] Department of Basic Education, 2013b: 19.
[61] Learner Unit Record Information Tracking System.

achieved considerable success in the use of data, although the approach has been a rather centrist one. Importantly, it is with respect to *data use* that WCED has been rather centrist. In other respects, for instance in the area of school financial management and procurements, WCED has pursued a relatively *de*-centralised approach.

With regard to school management systems, it is worth noting that some WCED officials, drawing from lessons learnt in work on i-SAMS, believe that the national initiative around improving the **SA-SAMS** system should concentrate on an incremental building of functions, and not attempt to satisfy all needs initially.

Integration across different datasets is made difficult in many provinces because different systems, such as the payroll system, the examinations system and enrolment databases, do not all use the same **school identifiers**. This is reportedly not a serious problem in WCED due to relatively strict adherence to a schools master list across all systems.

One gap in WCED's planning system is the absence of sufficiently reliable **long-range projections of future enrolments**. This makes long-range planning, for instance relating to infrastructure development and future staffing needs, difficult. Provincial and sub-provincial population estimates produced by, for instance, Statistics South Africa are seldom used, in part because the extent to which they are sufficiently reliable for specific planning purposes is not clear.

One area in which there has been significant recent work, is **better school-level measures of socio-economic status** (SES). As explained in earlier sections, such measures are essential if schools are to be fairly judged as good or weak performers. A 2015 report produced for WCED[62] examines innovative methods for using population census data to determine SES measures for schools which are more finely calibrated and current than the existing poverty quintiles. Specifically, the methods make use of Census 2011 values at the 'small area' and 'subplace' levels relating to household income, the educational attainment of adults, labour market status, household assets and household services. Moreover, for schools in Cape Town only, the addresses of learners in CEMIS were used to examine SES measures based on the actual place of residence of learners, not just the location of the school. This data work could assist WCED in the complex task of arriving at firmer measures of the effectiveness of schools, through the linking of performance data to SES.

The utility and limitations of the existing **school poverty quintiles** should be explained. They were designed mainly to permit pro-poor public funding. In this respect they fulfil their purpose relatively well. Because the quintiles are national, and because Western Cape is not a socio-economically average province, one would not expect to see an equal number of learners across the five quintiles in the province. In fact, 33% of all Western Cape's public ordinary school learners are in the least poor quintile, quintile 5, whilst only 10% are in quintile 1, the poorest quintile. The fact that a third of learners are in the largest quintile (quintile 5) clearly limits the utility of the quintiles for establishing which schools should be compared when assessment results are analysed. Ideally, a more fine-grained measure of socio-economic differentiation is needed. Moreover, as pointed out in the 2015 report referred to in the previous paragraph, the existing quintiles have become weaker measures of socio-economic status over time, for a couple of reasons. Firstly, they are based on relatively old data. Secondly, they were designed to reflect the socio-economic status of areas surrounding schools, and not the areas which learners come from (this is in fact in line with national policies), yet commuting by learners to schools in areas in which they do not reside has become increasingly common.

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[62] Zoch, 2015.

Periodically, WCED contracts a service provider to examine the quality of its data. A 2014 **report on CEMIS learner data** produced by PricewaterhouseCoopers (PwC) was examined as an example of this work[63]. This report focussed on the data of a sample of 92 schools. These schools were all visited by fieldworkers, who interviewed people in the school managing CEMIS, the intention being to understand patterns found in the data. A physical headcount of learners was not conducted[64]. The data were in general found to be of a relatively good quality. One area of concern was data on absenteeism. The number of absent learners on CEMIS was found on average to be 18% lower than the true numbers (meaning, for instance, that if on a day 3.0% of learners were reported to be absent, that figure should have been 3.7%). Perhaps most importantly, the PwC report finds that processes in schools whereby CEMIS data are updated are too unsystematic, raising the risk of inaccurate data. Moreover, it was found that school principals have too little support to do the required data capturing. Interestingly, the PwC report does not consider whether the amount of data being submitted could be reduced.

In the literature review that accompanies the current report, it is pointed out that experts underline the importance of having an **over-arching information strategy** in an education bureaucracy. Interestingly, WCED has no such strategy, nor did officials interviewed see this as a critical gap. It seems that in the case of WCED, focussed leadership and a unity of purpose amongst senior managers reduce the perceived need for a formal strategy document.

Way forward

Above all, CEMIS should be used more systematically for the **monitoring of grade repetition and dropping out**. In fact, this type of monitoring is one key reason why a schooling system would invest in a learner-level data warehouse, as opposed to just the submission of aggregate learner numbers by schools. A by-product of this monitoring work is that it will help in bringing about **adherence to non-changing unique learner identifiers**.

More complex research work that should be taken forward includes using a combination of CEMIS and household data to gauge the **socio-economic contexts of schools** better (this can lead to fairer assessments of school performance) and producing **long-range enrolment projections**, which are necessary for effective planning.

WCED should increasingly encourage innovative **data use for management purposes at the district and school levels**, partly by building human capacity, and partly by making microdata easily accessible at these lower levels.

5.5   Finance data

WCED officials are on the whole satisfied with the functionality of Treasury systems, in particular the **Persal payroll system**, government's **Basic Accounting System** (BAS) and the data querying interfaces **Vulindlela** and Kitso.

However, in one respect financial systems are said to be problematic. Because they do not follow a strict cash basis of accounting, but rather a '**modified cash basis of accounting**'[65], there is a window period of around three months during which transactions can be entered for a past date (up to around three months). This has a number of implications. The implications for personnel spending, or the 'compensation of employees' item, are discussed here. At any
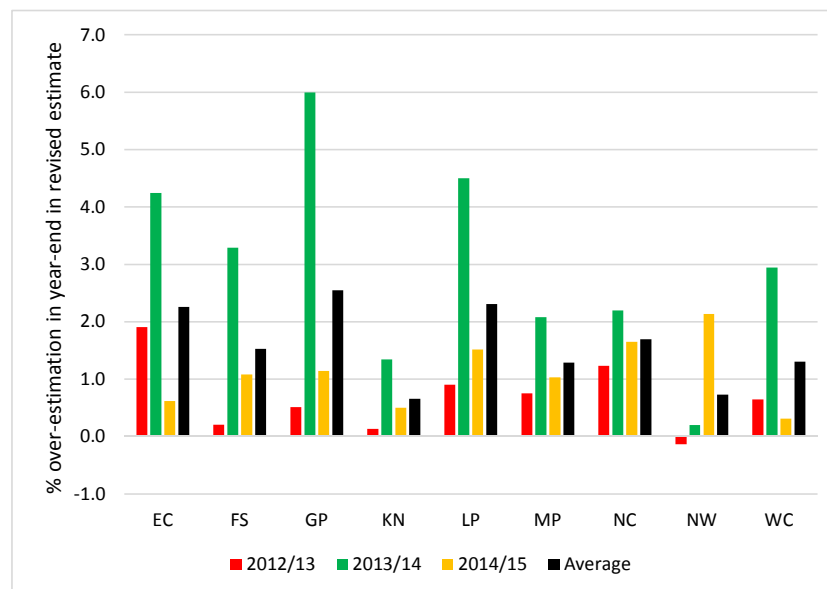
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[63] Western Cape Government: Department of Education, 2014b.
[64] Whether the absence of a headcount points to a gap in the work is debatable. The literature review accompanying the current report discusses difficulties that have arisen in the past in relation to headcounts in national samples of schools.
[65] National Treasury, 2015.

point in time, if a department wants to know how much has been spent on personnel, it must rely to some degree on estimates of backdated transactions which will be entered on the system at a future date. This **complicates the planning of personnel spending**, for instance decisions around how many temporary educators can be employed. In the current context of austerity, it makes decisions around what posts and promotions to 'freeze' difficult. One indicator of a provincial education department's ability to estimate accurately what its personnel spending to date is, is the ratio of the 'revised estimate' of personnel spending for the preceding financial year published in around March (the last month of government's financial year) and the audited and final version of this figure published a few months later in its annual report, in around September. As seen in Figure 2 below, the earlier revised estimate is nearly always higher than it should have been. WCED has been relatively good at producing an accurate estimate. For instance, it exceeded the final audited figure by just 0.3% for the 2014/15 financial year. Yet in other years WCED has experienced more serious over-estimation problems, for instance almost 3.0% in the case of 2013/14. It seems as if the recent improvement has been the result of the recruitment of a new planner in WCED with strong skills in this type of work. (Reportedly one reason why the pre-audit estimates are nearly always *over*-estimates is that an over-estimate is seen as more likely to bring about a generous allocation for the next year on the part of the Provincial Treasury. This suggests a fair degree of 'gaming' between the education department and Treasury. The extent to which this may occur in Western Cape was not investigated.)

Figure 2: Over-estimation of year-end revised estimates (compensation of employees)

Source: Estimates of Provincial Revenue and Expenditure standardised tables in Excel format available at http://www.treasury.gov.za/documents/provincial%20budget/default.aspx. To illustrate, the WC value of 0.3% for 2014/15 is the degree to which the 2014/15 'revised estimate' compensation of employees value appearing in the 2015 EPRE exceeds the 2014/15 'audited' compensation of employees value appearing in the 2016 EPRE. 'Average' is the average across the three other columns.

Importantly, BAS uses schools as cost centres, so it is possible to use BAS to monitor **WCED's spending per school**, whether this spending takes the form of a transfer to the school, or spending by WCED on behalf of the school. Of course much of the latter would consist of salaries to schools-based staff. Not much of this school-level monitoring occurs. On the non-personnel side it seems as if BAS would allow for per-school (and by implication, per-learner) monitoring of spending not just with respect to the widely discussed school allocation, but also with respect to other expenditure areas, for instance scholar transport and

school nutrition. Perceptions that the state spends more on every rich child than every poor child are fairly common, yet they are often untrue. Correcting incorrect perceptions of this kind would be one important reason why one should strengthen analysis that can reveal per-learner spending patterns[66].

Though the Auditor-General (AG) has not shown much interest in the **spending undertaken by schools**, spending which does not fall within the ambit of the Public Finance Management Act and which moreover draws from a mix of public and private funds, very recently the AG has indicated that school-level spending should be monitored more closely by WCED. Clearly, establishing a system whereby paper-based annual financial statements of schools were captured into a database would widen the scope for monitoring, but such capturing would also be costly. Perhaps the optimal solution is for the new SA-SAMS financial modules to be sufficiently robust to attract a critical mass of schools, and then for the financial data to be fed into a central data warehouse.

Whilst the **relationship with the Auditor-General** with respect to financial accounting is fairly straightforward and unproblematic, this relationship in the area of non-financial performance accounting can be problematic. In particular, WCED officials complain about the ability of AG officials, who are trained in financial accounting, to understand education performance statistics such as indicators of academic progress and grade attainment. It is difficult for AG officials to develop over time a deeper understanding of the sector-specific performance statistics as these officials are often rotated across sectors (and provinces), partly to ensure that the closeness of the relationship between the AG officials and officials in the audited department does not influence the objectivity of the audit. One solution would perhaps be for the rotation to occur across provinces, but not across sectors. Another would be for the AG to focus on a narrower set of highly strategic sector-specific performance indicators, and to develop a deeper understanding of just these indicators.

Way forward

What should be a priority is more accurate **in-year monitoring of personnel spending**, given the size of the budget and the strategic importance of human resources. WCED is relatively successful in this area, yet it does experience problems. It is noteworthy that the work here tends to depend strongly on individual planners and their own tools, and very little on more formal and institutional tools. The work of innovative individuals is important, but if methods are not sufficiently institutionalised, losing individuals can be more damaging to the organisation than it should be. Given that the nine provinces face similar challenges in monitoring personnel spending and **estimating future costs**, much of the work that must happen should involve collaboration between provincial departments, and clear leadership by the DBE.

5.6   Human resources and payroll data

WCED's officials believe **Persal** is relatively well utilised. Posts, whether empty or filled, are correctly entered in the system, and the current school of employees is correct (meaning when they change schools, Persal is updated accordingly). Persal is updated at the WCED head office, following submission of the relevant paper forms. Extracting reports from Persal is relatively easy, using for instance the nationally designed Vulindlela interface. One instance where Persal is updated automatically using data from a separate provincial system is where

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[66] Department of Basic Education (2015: 50) indicates that in recent years personnel spending by the state, expressed in per learner terms, has been equal to slightly pro-poor in Western Cape, depending on how one reads the figures, and more equitable than personnel spending in some other provinces. Given the strong policy emphasis on pro-poor spending when it comes to non-personnel items, it seems very likely that the global per learner expenditure pattern in Western Cape would be slightly pro-poor.

teacher attendance details are moved from the PMPS system to Persal. This occurs at regular intervals.

A key process occurring each year is the **determination of posts each school is entitled to**, which leads to the issuing of 'post establishments' for the next year to each school in August. Simulations of the formula used to allocate posts have led to the finding that Western Cape succeeds, to a much greater degree than other provinces, in ensuring that 'educators follow learners', and hence in promoting equity in the human resourcing of schools[67]. A series of Deloitte reports covering all provinces found the process in Western Cape to be satisfactory, on the whole[68]. Moreover, Western Cape and Gauteng were found to be the only provinces which gave post entitlements to schools which were properly costed and affordable within the available budget[69]. How did Western Cape achieve this? Essentially two important things take place. Firstly, the national post provisioning formula is implemented by a robust **computerised system** which provides the necessary analysis and reports. It is thus not a 'black box' that simply produces posts per school. This system resides within WCED's EduInfoSearch management information tool and has existed for around ten years. Secondly, considerable **human effort is invested in spreadsheet work** that cannot be done by EduInfoSearch. For instance, estimates around the degree to which lags between the vacating and filling of posts make more money available for the overall pool of posts must be calculated using fairly 'manual' methods.

Systematising exceptions is a sign of a good system. One clear piece of evidence that this happens in WCED's systems is the fact that unanticipated enrolment changes at the start of the year and the possible need for 'growth posts', are managed through CEMIS. This thus reduces a situation where exceptions are dealt with in an ad hoc manner, based on relationships school principals have with particular officials. Such a situation can lead to nepotism and unfairness.

WCED is exploring the implementation of a formula for **allocating non-educator posts** to schools, within EduInfoSearch.

In Western Cape, as in other provinces, the data that have been collected through the **Annual Survey teacher questionnaire** for around 15 years are to a large degree under-utilised. Surprisingly, given the low usage of the information, the datasets are rather well populated. Western Cape's teacher questionnaire data for 2013, available within the consolidated national Annual Survey database of the DBE, were examined to gain a sense of data completeness. Details on around 36,000 educators exist (this would include educators in the province's approximately 220 independent schools). Around 31,000 educators carry records indicating what combination of grade and non-language subject they teach. On average, each educator has six such records. The data thus seem relatively complete. What is the cost of not using these data? Not doing this means that WCED will not have an empirically informed view of how the time of teachers is used in schools, how teachers are distributed across grades and subjects, and the dynamics behind the class sizes experienced by learners.

To some extent, the Annual Survey teacher questionnaire data can also help answer the question of whether teachers are teaching classes they have been trained to teach, and are confident to teach. Here some work has been undertaken by WCED. Specifically, a 2016 report[70] finds that in grades 7 to 12, whilst around 90% of teachers teaching mathematics and physical science are qualified to teach their subject, the **great majority of language teachers do not have the relevant qualification** for this. This type of analysis should be taken forward
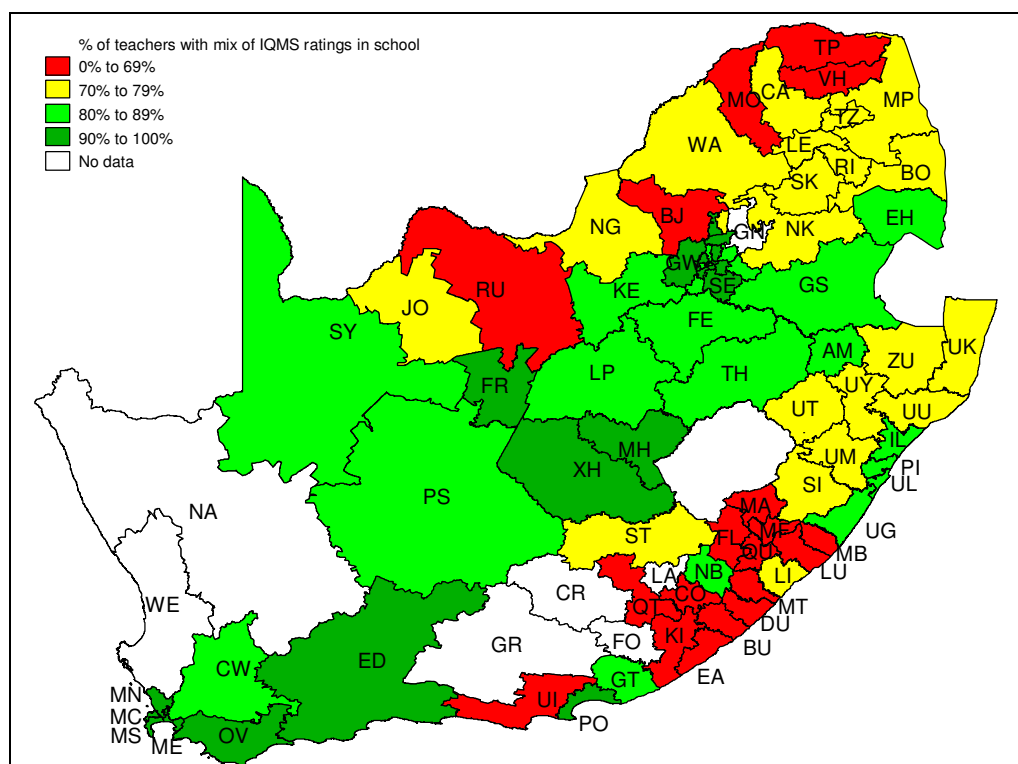
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[67] Gustafsson, 2015: 35.
[68] Deloitte, 2013a.
[69] Deloitte, 2013b: 38.
[70] Western Cape Government: Department of Education, 2016a.

by WCED, and its policy implications made clearer. For the latter, it would be necessary to examine correlations between the correctness of a teacher's qualification, and learner performance. The dynamics are clearly complex, and there are no simple answers. There are many reasons why teachers end up teaching subjects they are not qualified for, ranging from supply shortfalls, decisions of the school principal, and the preferences of teachers for specific subjects and schools (a teacher's remaining in the teaching profession may be conditional on working close to home, for instance, even if this means teaching the 'wrong' subjects). Teachers who are not qualified for a specific subject are not necessarily the worst teachers. This is especially true for subjects such as language.

In section 5.1 the importance of having **different IQMS ratings within the same school** was explained. In general, there is not a strong belief amongst WCED officials that the IQMS performance management system adds much value to schooling. This view is shared by many schools-based educators. By extension, analysing IQMS data is not considered a priority[71]. Scepticism about the utility of performance management systems in schooling systems is not unique to Western Cape or South Africa. Yet it seems the IQMS warrants more careful analysis. As illustrated by Figure 3 below, the IQMS is implemented rather differently in different districts. In some districts across the country the trend is for everyone in the same school to obtain the same IQMS rating. This essentially means that the school principal is not prepared to acknowledge that certain teachers need more support than others. In the districts of Western Cape, however, differentiation within schools is the norm, suggesting a school culture where outstanding work by some teachers is acknowledged. These patterns suggest the IQMS data should be used to a greater degree by researchers trying to identify the characteristics of better performing schools.

Figure 3: Effectiveness of IQMS implementation by district

Source: Microdata collected for Department of Basic Education (2012).

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[71] Some analysis has been undertaken, for instance the breakdowns by IQMS rankings of educators are provided in a 2016 report on staffing dynamics within 26 'focus schools' (Western Cape Government: Department of Education, 2016b).

Comments by interviewees point to ways in which the IQMS could be improved insofar as the accuracy of its data is concerned. In particular, the opinions of peers (other teachers in the same school) seem to carry too large a weight in the IQMS process. There is a sense that **recent improvements in the Performance Management and Development System (PMDS)** applicable to office-based non-educators should inform enhancements in the IQMS.

There is a strong interest in WCED to bring about **a more informed strategy for school management**. The **competency-based assessments (CBA)** system described in section 5.1 produces data which could facilitate the required research. WCED in fact receives anonymised data from the CBA service provider which could be used to examine, for example, the most critical skills gaps amongst managers, and how they view the education process.

WCED's annual report has in recent years included **a substantial section covering the human resources of the organisation**, who account for around 75% of WCED's spending. This section of the annual report was examined in the literature review preceding the current report. In general, it could be strengthened through more clarity on the derivation and interpretation of key statistics such as the learner-educator ratio and the attrition rate. Inequities across schools with respect to access to teachers could also receive more attention. Long-range trends with respect to employee numbers and their ages would also help to clarify the challenges of the sector[72].

The need for more in-depth research is discussed in section 6 below. In the area of research into teachers, the **Centre for International Teacher Education** at the Cape Peninsula University of Technology (CPUT) seems an obvious partner which whom WCED could develop a closer relationship to advance good use of WCED human resources data.

The national Department of Public Service and Administration (DPSA) initiated some years ago a system for recording the training gaps and needs of individual public employees. This system, known as **HR Connect**, involved the completion of questionnaires by virtually all of WCED's employees. The result was a report of around 1,300 pages[73], consisting mainly of statistical tables. WCED's officials agree with criticisms which have been directed at HR Connect, namely that its purpose was not sufficiently clear and that the sustainability of the programme seemed uncertain. Clearly the monitoring of skills shortfalls in the public sector is important, but much work and experimentation is still needed, it seems, before appropriate systems are achieved.

The involvement of WCED in SACE's **CPTD system** (discussed in section 5.1) has been limited. Officials have expressed concerns around the degree to which the system, and the efforts put in by educators to update their professional development details, contribute towards better teaching and learning. It would probably be good for WCED to monitor more closely and systematically what the impacts of the system are on teachers and what happens in schools, partly so that feedback can be given to SACE. Moreover, WCED ought to obtain access to the data, even if this involves anonymising the data in order to protect the privacy of educators. Like the IQMS data, the CPTD data should be a part of the overall set of data researchers would need to understand the effectiveness of the province's schools.

In the area of professional development, much of the focus of WCED has been on monitoring the activities of the **Cape Teaching and Leadership Institute**, or **CTLI**, which plays a

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[72] The New South Wales Department of Education annual report discussed in the literature review, a report which includes a human resources section, is a possible source for ideas on how to make the analysis more strategically focussed.

[73] Department of Public Service and Administration, 2012.

pivotal role in offering in-service training to the province's teachers. Data on which teachers get to participate in which CTLI courses seems to be well-maintained, which obviously assists in the planning and management of in-service training.

Way forward

A key priority should be to deepen the WCED's knowledge of how **the complex system of human resourcing** works in the province, and in the light of this to produce better monitoring of trends. There is already a useful channel for directing this work, namely the human resources section required in the annual report. This is perhaps a useful point of departure. The efficiency and equity of the current human resourcing practices should be 'unpacked'. This is likely to lead to a very long 'menu' of possible analyses that can be undertaken with the data WCED currently has. In fact, the menu is likely to be too long and certain analyses will have to be carefully prioritised. Apart from the obviously important Persal payroll data, other data which should increasingly be analysed include teacher-related data on CEMIS, IQMS ratings and professional development data collected by SACE.

The logical extension to a good analysis of past human resources trends is a more informed picture of **where WCED is heading in the short- to long-term** with respect to the staffing of schools and other institutions.

An excellent initiative of WCED is the '**customer satisfaction survey**' discussed in section 5.1, which gauges the degree of satisfaction of schools-based staff with various aspects of WCED's operations. Whilst the survey data are used to produce an annual survey report, the information seems under-utilised. Making the survey report available on WCED's website would help to reassure employees that their concerns were being listened to, and would bring about a more informed policy discourse. Whilst the survey is mentioned in WCED's annual reports, the information from the survey could be used to identify what the successes and challenges of the system are.

5.7 Physical infrastructure data

National Treasury projects in recent years aimed at strengthening capacity in the building and maintenance of school infrastructure have borne fruit and WCED officials report that, for instance, important professionals such as quantity surveyors are now available when they were not previously. At the same time, despite considerable funding improvements and a focus on capacity building, physical infrastructure, perhaps more than any other school planning function in the province, experiences particularly serious problems relating to the basic way things get done. This is discussed below. It is also noteworthy that infrastructure maintenance is amongst the worst rated aspects of WCED's service delivery, from the perspective of the school and according the customer satisfaction survey (see section 5.1).

The **maintenance schedule** referred to in section 5.1 has been compiled on the basis of a survey of the conditions of schools undertaken in 2012 and 2013. The schedule spans ten years, during which time all maintenance issues picked up in the original survey would be dealt with. This is not ideal as the system assumes, for instance, a fairly static problem, which is clearly not the case. Understandably, many deviations from the original schedule must occur, some justifiable, and others of a more political nature. As school infrastructure is widely considered a politically sensitive matter, it is easy for political pressures to influence the prioritisation process. WCED planners would ideally like to have a more live and up-to-date database of the conditions of schools, but this would be difficult and costly to realise, partly because external evaluators would be required to ensure that similar criteria were applied to all schools.

Turning to projects aimed at **building new structures**, Treasury requires each education department to develop a 'user asset management plan', or UAMP, where the rationale for future spending plus lists of facilities to be targeted in the coming years are made clear. An example of a UAMP on the Web is that of Western Cape's health department[74]. The full UAMP of WCED is not available on the Web, but the list of schools receiving attention appear in an annexure to the province's *Estimates of Provincial Revenue and Expenditure* (EPRE). For instance, the 2016 EPRE includes ten pages with lists covering over 100 schools, and with projects extending as far as 2020[75]. It is believed that school principals may have problems interpreting these lists, meaning the system may not be as transparent it perhaps ought to be. Put differently, it seems there is some uncertainty around when specific schools come to benefit from particular interventions. Apart from possible problems relating to political interference, which could upset existing plans, the fundamentals of the delivery system make delays very common. Specifically, WCED's reliance on the province's Department of Transport and Public Works makes processes overly bureaucratic, as do the large number of regulations that any project must comply with. This results in high unit costs. These observations are not specific to education or the Western Cape. The National Development Plan refers to the problem of the 'spiralling costs of building schools'[76].

The **National Education Infrastructure Information Management System**, or **NEIMS**, is a national database with details on the physical infrastructure of schools. At certain points in recent years this database has been systematically updated by means of physical surveys of groups of schools by independent agents employed by the DBE. When WCED completes building projects, details are entered into NEIMS using a web-based portal. However, updating is not systematic enough, partly because some school infrastructure changes come about as a result of processes falling outside UAMP-type projects, and as a result inaccuracies in NEIMS are often found.

The **Annual Survey** did in the past include questions on infrastructure, but this was stopped partly as it was felt that independent NEIMS surveying would create a more accurate picture. However, it seems as if there is value in obtaining on an annual basis reports from schools on certain physical infrastructure details, even if such data may to some degree be subjective. Clearly subjective data cannot be the basis for prioritising physical infrastructure projects, yet it has monitoring uses and can even alert planners about problems in their primary datasets. In particular, annual reporting by schools on matters such as the use of classrooms, and the state of toilets and perimeter fencing seems useful.

The CEMIS facility allowing schools to **order furniture**, and currently used by around 700 schools (see section 5.1), is expected to be rolled out to all schools in the next few years.

Data on school infrastructure are used by planners in WCED to prioritise work going forward, but it is barely used to understand better the deeper problems in infrastructure development. In particular, there is too little research into **unit costs**. New cost models developed by National Treasury are expected to throw more light on this important matter, but their utility is as yet largely untested.

Way forward

It seems some of the solutions in the area of infrastructure development relate to having better data and using these more effectively. However, there are clearly other areas of concern too, such as an excess of bureaucracy and regulations. Ideally, better data not only permit more rational and demand-driven planning, they are also able to **strengthen accountability** in a

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[74] https://www.westerncape.gov.za/assets/departments/health/uamp2014_2015.pdf.
[75] See pp. 207-16 of the EPRE available at https://www.westerncape.gov.za/dept/treasury.
[76] National Planning Commission, 2012: 313.

manner that counteracts political interference. Specifically, if school communities have access to easy-to-understand schedules of maintenance and building projects, they can serve as an important force insisting that the administration sticks to its plans.

There seem to be two priorities. Firstly, ways need to be found of maintaining **a more accurate database of school infrastructure**. Clearly not every infrastructure item is equally important for planning purposes. The most critical variables should be prioritised.

Secondly, accountability and transparency could be promoted through the **publication of project schedules on the WCED website**, plus guidelines on how these should be interpreted and steps school communities can take if they believe they are not being receiving fair treatment.

5.8   Learning materials data

WCED is **in general satisfied** with its existing CEMIS-based handling of data on books. This system allows WCED to provide needed services to schools without maintaining book warehouses of its own. One of the few areas in Western Cape's education system over which the Auditor-General has raised concerns is textbooks. Schools are reported to receive more books than they need. WCED officials believe this is mostly due to school principals not forecasting accurately the books they will need in the coming year.

6   The use of data for more in-depth research

The Stellenbosch University reports says the following[77]:

> …there are immense further opportunities for utilising [WCED's data] better to inform policy and practice in the Western Cape education system, and to allow provincial, district and school authorities a better perspective on the functioning of the system and the room for improvement.

Section 5 above has focussed to a large degree on the important matter of using data to run the schooling system and monitor basic trends. Current practices, most of which can arguably characterised as good, have been described and a few recommendations for improvements have been made. Some of these recommendations are about **using data to deepen WCED's knowledge of the system**, so that it is better equipped to perform long-range planning and to be a leading voice within a more evidence-driven public debate about the future of schooling. For instance, more could be done to gauge accurately whether learners are increasingly able to display basic reading and numeracy skills which underpin all of education. Whether the speed of this improvement is acceptable should also be carefully assessed. The current utilisation of teacher time in schools and how school principals manage schools should become clearer.

In a way, research deserves its own section because it is cross-cutting. It cuts across the elements of the schooling system used to organise the discussion in section 5. What an organisation such as WCED should ideally have is a team of researchers who are to some degree outside the annual planning cycle, meaning they are able to focus on longer-range issues, and whose responsibility it is to understand and analyse all of WCED's data. These **researchers should be outside the main 'silos'** (human resources, finance, assessments, infrastructure and so on), so that their focus becomes broad. In fact, the researchers should in a sense be 'silo-busters'. Currently WCED has a research function, but the relevant officials are also close to specific systems that must be run annually, in particular the systemic tests. This makes it difficult for the officials to utilise WCED's data more broadly. A research function in government should be partly about research conducted within government, and

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[77] Van der Berg *et al,* 2015: 3.

partly about networking with (and contracting) researchers outside the organisation. Both are necessary. Research officials who never engage in their own research and data analysis are unlikely to be good at encouraging outside researchers to focus on the right things. At the same time, an organisation such as WCED needs to rely on external researchers, to some extent, if the right kind of knowledge in sufficient quantities is to be produced.

7   How replicable might WCED's achievements be elsewhere?

This question is critical for the current report as part of its intention is to **provide documented cases of relatively good practices within WCED to a wider audience**, so that this can inform improvements outside Western Cape.

Two facts stand out that should inform the replicability of WCED's achievements. One is that there is **considerable interest on the part of the other eight provinces to learn from Western Cape**. In fact, even internationally Western Cape's schooling system has been considered an interesting system the world could learn from[78]. That other provinces should turn to Western Cape is perhaps remarkable given the political differences between Western Cape and the rest of the country, and attests to the maturity of government in South Africa. Western Cape is often seen as a province to learn from in consultations organised by the DBE and involving all provinces. Officials from other provinces have been on **study tours** of the Western Cape to learn from WCED.

The second fact that stands out is that Western Cape has followed **a rather different systems development trajectory** in basic education, relative to other provinces. In particular, the SA-SAMS school management software, which is seen as a backbone for future systems development across the rest of the country, is barely used in Western Cape. Another key difference in Western Cape has been the programme of systemic tests, which is unlike anything seen in any other province.

A different approach (essentially a non-adoption approach) to SA-SAMS in Western Cape does limit the replicability of WCED's systems. However, **WCED has clearly established itself as a leader within the country with respect to standardised assessment systems**, and it is probably here that other provinces stand to learn a lot from Western Cape. However, for this learning to occur, there needs to be a more deliberate attempt by Western Cape to share its lessons, and to share technical documentation. Other provinces, and DBE, should of course be more emphatic in requesting information about the systemic tests programme. As has been explained in section 5.3, this programme needs to develop further and is clearly not perfect. The imperfections of the programme could discourage some from learning from it. This would be a mistake. Skills and techniques in standardised testing systems have tended to develop slowly over time, and in a cumulative fashion, and there is moreover a limit to the number of relevant experts available for South Africans (specifically English-speaking experts with some exposure to programme implementation in a developing country context). The skills and insights accumulated since 2002 around the systemic tests programme of Western Cape are rare, and should be widely utilised.

Future study tours to Western Cape should in part focus on the work of the **Centre for e-Innovation** (CEI) in the Premier's Office. This centre has been pivotal in ensuring that WCED does not fall into the trap, all too common in governments around the world, of starting but then not successfully finishing information systems projects. The exact ingredients of CEI's success, beyond the presence of skilled information technology specialists, were not investigated in preparing the current report. Logical, well-communicated

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[78] Mourshed, Chijioke and Barber, 2010.

but also sufficiently flexible standards are often crucial for the development of e-government systems[79]. How CEI has managed this aspect of its work could be examined further.

Information systems in schooling cannot be viewed in isolation from the broader questions of leadership and organisational culture. They clearly rely on each other. Learning from Western Cape must include considering the six 'critical elements' to which WCED's achievements are ascribed in section 3 above.

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[79] See for instance Braa *et al* (2007).

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Appendix A

Table 2 below (two tables down) serves as a useful tool for understanding enrolment movements between two years, and likely data quality problems in CEMIS. The table draws from national LURITS data, which in turn draws from the original CEMIS data. It represents movements in Western Cape between 2013 and 2014.

As pointed out in section 5.4, Western Cape's data quality is high relative to that of other provinces with regard to the ability to link the same learners across different years. Yet, as seen in Table 1 below, there are problems. In particular, 2.9% of grades 2 to 12 learners in 2014 could not be found anywhere in the data of 2013, not even in the data of another province. Insofar as this reflects movements into Western Cape from other provinces, the problem would lie with the ability of provinces to share learner unique identifiers effectively. However, the problem could also lie with the incompleteness of the 2013 data (at least as it appears in the national LURITS dataset). The global totals derived from the learner records in 2013 are around 1.0% lower than published enrolment totals. Clearly if the version of the data used had missing records, this would to some extent explain why learners from one year would not be found in another year.

An important interpretation risk in relation to the data should be explained. An incomplete reading of the data could conclude that, for instance, the drop-out rate for grades 2 to 4 is 3%, a worrying figure. It is true that Table 2 points to 3% of learners in grades 2 to 4 in 2013 being out of school in 2014. This comes to just under 9,000 drop-outs. However, the table also points to 6,000 learners being out of school (in any province) in 2013 and in grades 3 to 5 in Western Cape in 2014. It is likely that these 'drop-ins' and the 'drop-outs' are the same children, whose unique identifiers changed across the two years. A truer number of drop-outs is probably closer to 3,000 (9,000 minus 6,000) than 9,000.

Table 1 provides a few key indicators relating to the transition matrix.

Table 1: Key indicators of the reliability of the transition matrix

% of Year 1 learners not present in Year 2	10.9
above for grades Pre-R to 11 only	6.6
% of Year 2 learners not present in Year 1	12.6
above for grades 2 to 12 only	2.9
% of learners present in years 1 and 2 with an irregular grade-on-grade movement	0.05

Table 2: Transition matrix 2013 to 2014 for Western Cape

	Not in	Other	Pre-R	R	1	2	3	4	5	6	7	8	9	10	11	12	Total
Not in			4,490	72,598	32,182	2,357	2,513	1,856	1,718	1,540	1,418	3,212	3,080	3,770	2,226	1,145	134,105
Other			5	388	1,185	1,106	1,055	943	809	798	754	1,038	851	1,509	527	71	11,039
Pre-R	245	22	430	3,087	62		1										3,847
R	3,070	917	1	4,636	61,076	16	4	1									69,721
1	3,374	1,494		10	15,972	88,027	47	7	1	1							108,933
2	2,825	1,241			1	8,968	83,584	18	8	6							96,651
3	2,712	1,009			1	1	4,800	79,480	5	3	2		1				88,014
4	3,290	919					17	9,417	74,163	12	5		1				87,824
5	3,414	912					5	1	5,574	71,325	24	5	1		1		81,262
6	4,583	777					3		3	3,718	71,344	8	2	2	2		80,442
7	7,542	926								2	1,967	67,506	11	2		1	77,957
8	6,235	801						1			1	5,020	64,327	18	4	1	76,408
9	12,906	967										2	14,537	58,747	25	2	87,186
10	9,333	761												11,713	56,953	91	78,851
11	6,236	221												3	5,280	45,563	57,303
12	47,477	52													3	198	47,730
Total	113,242	11,019	4,926	80,719	110,479	100,475	92,029	91,724	82,281	77,405	75,515	76,791	82,811	75,764	65,021	47,072	1,187,273

Note: Row headings refer to situation in first year, column headings refer to that in second year. 'Other' means registered in another province.