EDUCATION DIALOGUE

Keynote Paper 2

Efficiency in Education Spending for Learning Outcomes

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CABRI Education Dialogue

Keynote Paper 2

Efficiency in Education Spending for Learning Outcomes

Contents

List of tables, figures and boxes **iii**

List of acronyms **iv**

1. Introduction: Efficiency in providing education **1**

1.1 The 2012 South African textbook scandal and inefficiency around education inputs **1**

1.2 Inefficiency with regard to education outcomes **3**

1.3 Conclusions about efficiency and inefficiency in education **6**

1.4 A note on definitions and the policy framework **7**

2. Internal efficiency **10**

3. Allocative efficiency: Does funding flow to priority areas and groups? **13**

4. Technical efficiency **16**

4.1 Data envelopement analysis: Comparing to what is possible **16**

4.2 Analysing efficiency and effectiveness in education **17**

5. Education reform for efficiency **23**

5.1 Specifying key inputs **23**

5.2 Accountability **25**

5.3 Other levers for system reform **29**

5.4 Building country research capacity **30**

6. Conclusion: Education/finance dialogue and improving efficiency **32**

References **33**

List of tables, figures and boxes

Table 1.1	Reading textbook access for pupils in SACMEQ II and III	**1**
Table 1.2	Performance on literacy – standard and adjusted measures – SACMEQ 2004	**4**
Table 1.3	Comparison of per learner spending, attainment and outcomes in selected African countries	**5**
Table 1.4	Programme for International Student Assessment (PISA) 2009 country average scores for science	**6**
Table 3.1	Allocation decisions: Suggested sub-sectoral budget shares and estimates for some country groupings and African countries	**13**
Table 3.2	Allocation decisions across country groupings	**14**
Table 3.3	Components of the budget cycle and performance criteria	**15**
Table 4.1	Overview of findings of various production function studies: Proportion of cases in which specific input was found to be significantly positive	**18**
Table 4.2	Suggested benchmarks for primary education efficiency and quality	**21**
Table 5.1	Overview of governance challenges in education and indicators and indicator sets	**30**
Figure 1.1	Performance on literacy – standard and adjusted measures – SACMEQ 2004	**5**
Figure 1.2	The results chain and definitions of efficiency and effectiveness	**8**
Figure 1.3	Policy levers and improving outcomes	**9**
Figure 2.1	Sub-Saharan Africa's education pyramid, ca. 2009	**10**
Figure 2.2	Entry and flow through the education system – regions comapred	**11**
Figure 4.1	Illustration of an efficiency frontier for different producers	**16**
Figure 4.2	Heneveld and Craig's (1996) conceptual framework of factors that determine school effectiveness	**19**
Figure 5.1	Teacher performance incentives	**28**
Box 1.1	Failure to deliver, comment on the 2012 Limpopo, South Africa textbook scandal	**2**
Box 1.2	On the web: 'How to build a pit latrine' (http://www.justadrop.org). Can it be right? Is it appropriate, efficient and effective?	**3**
Box 2.1	Dealing with internal inefficiency and repetition in Brazil	**12**
Box 4.1	Findings from a 'natural experiment' – comparing Botswana and North West Province, South Africa	**22**
Box 5.1	McKinsey (2007) on key education success factors	**24**
Box 5.2	An 'input' list for developing countries	**24**
Box 5.3	Definitions: accountability and related concepts	**25**
Box 5.4	Examples of information interventions	**27**
Box 5.5	Capitation grants in Rwanda	**29**
Box 5.6	Education research in some of the world's top performers	**32**

List of acronyms

CABRI	Collaborative Africa Budget Reform Initiative
CONFEMEN	Conference of Ministers of Education of French-Speaking Countries
CPIA	Country Policy and Institutional Assessment
DEA	data envelop analysis
GDP	gross domestic product
IEA	International Association for the Evaluation of Educational Achievement
LLECE	Latin American Laboratory for Assessment of the Quality of Education
MDGs	Millennium Development Goals
MTEF	Medium-Term Expenditure Framework
NGO	non-governmental organisation
OPM	Oxford Policy Management
PEFA	Public Expenditure and Financial Accountability
PASEC	Program for the Analysis of Education Systems of CONFEMEN
PEM	public expenditure management
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
RCT	randomised control trial
SACMEQ	Southern and Eastern Africa Consortium for the Measurement of Educational Quality
TIMSS	Trends in International Mathematics and Science Study

1. Introduction: Efficiency in providing education

1.1 The 2012 South African textbook scandal and inefficiency around education inputs

During 2012, as Linda Chisholm (2012) points out, a 'storm of anger and outrage' erupted in South Africa in response to the non-delivery of textbooks to many schools in one of its poorest provinces, Limpopo. Government was taken to court by a human rights watch organisation (Section 27) and the judge ordered that textbooks must be in all schools by a specific date (15 June, the middle of the school year) and that a catch-up plan must be devised for certain categories of students. Government did not manage to deliver fully on the deadline by the 27 June and the saga continued.

The 2012 textbook drama was referred to by one journalist as 'this crass piece of elementary inefficiency' (Sparks 2013). Why, South Africans wonder, in a society with very high social and economic achievements – with, for example, flourishing, sophisticated industries, an admirable public infrastructure (in some ways) and prestigious institutes of higher learning – can something as simple, and as important, as adequate textbook delivery not be achieved.

Retail chains, finance officials muse, restock shops on a daily basis through automated ordering systems, and South African Breweries supplies thousands of bottle stores, pubs and shebeens (some in the deepest rural areas and most informal of settlements) with beers on a regular, timely basis. What is wrong with the South African education system that it cannot execute this seemingly elementary function?

Table 1.1 Reading textbook access for pupils in SACMEQ II and III

Country	% at each level in 2000				% at each level in 2007			
	No text	Share 2+	Share 1	Sole use	No text	Share 2+	Share 1	Sole use
Botswana	2.3	5.7	14.6	77.4	3.8	11.1	21.7	63.4
Kenya	2.8	46.1	24.3	26.8	2.2	58.6	21.5	17.8
Lesotho	12.1	16.3	16.3	55.3	7.2	17.4	9.5	55.9
Malawi	4.5	23.8	14.7	57.0	7.9	55.5	9.5	27.1
Mauritius	0.0	5.2	3.3	91.5	5.2	4.2	2.9	87.7
Mozambique	6.3	20.3	20.2	53.2	8.2	24.9	14.1	52.8
Namibia	5.1	18.1	30.1	46.6	5.6	31.1	31.3	31.9
Seychelles	8.0	17.0	28.1	47.0	3.6	6.7	47.4	42.3
South Africa	16.6	17.1	20.7	45.5	10.7	16.1	28.2	45.0
Swaziland	5.8	4.1	15.9	74.2	0.0	0.6	0.2	99.2
Tanzania	35.9	48.2	9.9	6.0	23.1	63.7	9.7	3.5
Uganda	20.6	52.8	11.9	14.7	20.4	47.6	14.5	17.4
Zambia	14.0	44.2	27.5	14.2	17.2	39.4	20.3	23.1
Zanzibar	24.6	62.3	9.2	3.8	2.2	32.9	16.8	48.1
Zimbabwe	7.5	48.5	19.6	24.3	19.3	47.0	19.0	14.7
SACMEQ	11.1	8.7	17.8	42.5	9.1	30.5	18.4	42.0

Source: Ross (2010)

When one moves on from this specific South African case to look at textbook provision more generally, one is struck by how much research and analysis effort has gone into textbooks and: (1) The very strong consensus about the importance and indeed cost-effectiveness of text-books as an input to teaching (Boissiere 2004; Majgaard & Mingat 2012; School of Education and Development 2010) and (2) for most of sub-Saharan Africa (SSA) the conclusions about textbook provisioning are quite negative. Most African education systems struggle with textbook provision.

In a 2008 study on secondary education in Africa the World Bank (2008b) found that mostly only the teacher would have a textbook (used to copy text onto blackboard for students), that in rural areas typically less than 20% of learners would have access to 'core subject textbooks' and: 'Only 1 out of 19 countries studied (Botswana) had adequate textbook provision at close to a 1:1 ratio for all subjects and all grades. In the other 18 countries secondary textbooks were in seriously short supply for most secondary school students.' Using SACMEQ data on grade 6 learners, Ross (2010) concludes that '[t]he general message was that textbook access levels for grade 6 pupils in many SACMEQ countries were rather poor – and that these access levels had tended to either stagnate or deteriorate in many SACMEQ countries between 2000 and 2007' (see Table 1.1).

Read (n.d) for DFID pointed out that textbook provisioning is not a problem only in Africa, arguing that 'it is still relatively rare to find countries, particularly in Africa, the Indian sub-continent and countries of the former Soviet Union where textbooks are made available regularly, reliably, predictably and in sufficient quantities to meet curriculum requirements'.

Box 1.1
Failure to deliver, comment on the 2012 Limpopo, South Africa textbook scandal

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Furthermore, examples of waste and inefficiency in education in Africa (for textbooks, that a key and cost-effective input is not made available as required) are of course not limited to textbook provisioning. Similar stories could be told for many cases of school inputs. To name but two:

Teacher provisioning: 'ghost teachers' – being on the payroll but not teaching anywhere; 'double-parked teachers' – where there are not sufficient learners for a subject but teachers are not transferred or retrained for relevant areas; and indeed real teachers with very high absentee rates and lack of motivation.

School facilities: where facilities are often inadequate – inappropriate water and sanitation services, little furniture and blackboards, no electricity for lighting and equipment, unusable in bad weather because of bad roofs, doors and windows – in spite of decades of investment and community participation.

Box 1.2
On the web: 'How to build a pit latrine' (http://www.justadrop.org). Can it be right? Is it appropriate, efficient and effective?

1.2 Inefficiency with regard to education outcomes

While inefficiency with regard to educational inputs has received a lot of attention in the past, the focus with regard to education policy has shifted strongly for some time to assessing the quality and efficiency of provisioning of outputs and outcomes. Until more recently it has been difficult to get benchmarks for comparison between countries and thus a comparative view of quality of outcomes and efficiency of provisioning. A growing number of standardised international assessments now, however, make it possible to compare not only educational attainment in different countries but also cognitive standards (literacy and numeracy) attained, and how these compare to educational investments (see Knight et al. 2012 and School of Education and Development 2010).

Although some African countries have participated in the International Trends in International Mathematics and Science Study (TIMMS) and Progress in International Reading Literacy Study (PIRLS) managed by the International Association for the Evaluation of Educational Achievement (IEA), the testing for Southern and Eastern Africa Consortium for the Measurement of Educational Quality (SACMEQ) and Program for the Analysis of Education Systems of CONFEMEN (PASEC) has allowed for a much sharper focus on educational outcomes in SSA and also on the relationships between inputs and outputs (efficiency).

The results from SACMEQ as analysed by Ross and Zuze (2004) show:

1. The availability of data to compare education performance between countries in SSA;
2. The current focus not only on inputs and standard educational attainment in terms of measures such as years of school attended but on outcomes of the education system such as cognitive ability provided through measures of literacy and numeracy in standardised tests (such as the average pupil reading score in Table 1.2);
3. The adjustment of scores to take account of socio-economic differences between countries ('quality' and 'social equity' in Table 1.2) and also to measure the distribution of educational outcomes ('distributional equity' in Table 1.2).

Figure 1.1 shows, for example, that while on simple average reading performance Seychelles outperforms Tanzania (score of 582 versus 546), if socio-economic status of learners is taken into account, Tanzania outperforms Seychelles (an adjusted score of 571 versus 509 for Seychelles). While South Africa and Namibia score similarly on 'quality' of the system (and weakly compared to most other countries), the differences between highest and lowest scores ('social equity') is much smaller in Namibia, and there is a much smaller spread of achievement ('distributional equity') in Namibia.

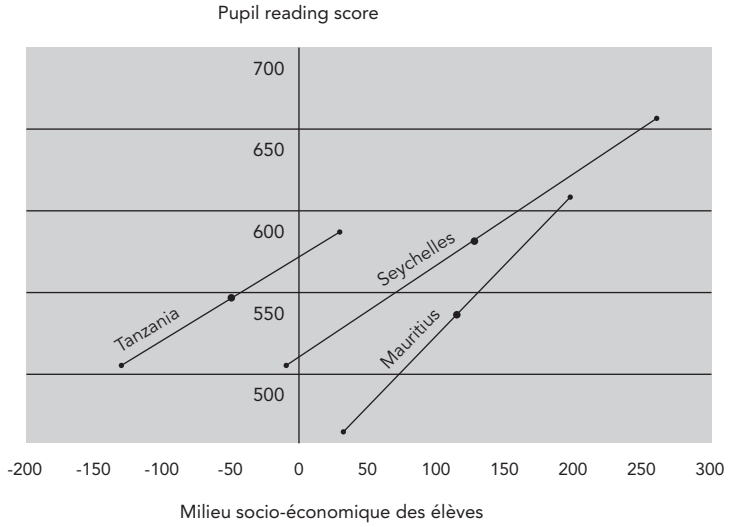
In addition to providing information on outcome performance and equity, as Van der Berg (2008) indicated, 'SACMEQ's rich data sets provide new possibilities for investigating relationships between educational outcomes, socio-economic status (SES), pupil and teacher characteristics, school resources and school processes'. Analysis is therefore not only limited to outcomes and equity but, by comparing these to inputs, assessments can be made about efficiency – the relationship between inputs and outputs and outcomes.

Table 1.2 Performance on literacy – standard and adjusted measures – SACMEQ 2004

School system	'Traditional' view	Alternative view		
		Quality	Social equity	Distributional equity
	Average pupil reading score	Line height	Line slope	Line length
Seychelles	582	509	58	155
Kenya	546	556	51	79
Tanzania	546	571	50	81
Mauritius	536	435	89	148
Swaziland	530	524	26	47
Botswana	521	520	36	78
Mozambique	517	523	16	42
South Africa	492	456	70	150
Uganda	482	506	41	83
Zanzibar	478	486	20	50
Lesotho	451	456	17	34
Namibia	449	456	48	75
Zambia	440	447	39	72
Malawi	429	437	17	25
SACMEQ	500	492	41	80

Source: Ross and Zuze (2004)

Figure 1.1 Performance on literacy – standard and adjusted measures – SACMEQ 2004



For example, data from SACMEQ, as used by Spaull (2012), enable us to compare inputs (here current spending per learner) to attainment (proportion of learners surviving until grade 5) and learning outcomes (grade 6 literacy and numeracy). The data show that while South Africa manages to retain students in the system, there is less learning taking place than in countries with much lower levels of per capita income and spending per learner.

Table 1.3 Comparison of per learner spending, attainment and outcomes in selected African countries

Country	GNP/cap PPP US$ (2008)	Current spend per pupil (PPP US$ 2006)	Survival rate Gr 5 (End 2007)	Gr 6 students functionally illiterate	Gr 6 students functionally innumerate
Botswana	13 100	1 228	0.89	11%	22%
Mozambique	770	79	0.6	22%	33%
Namibia	6 279	668	0.87	14%	48%
South Africa	9 780	1 225	0.98	27%	40%

Source: Spaull (2012); Unseco (2011); UIS (2009); SACMEQ III (2007)

Wide variations in performance and efficiency in education systems are not limited to African countries. Table 1.4, on the following page, provides the ranking of countries in the 2009 Programme for International Student Assessment (PISA) science assessments. Shanghai and Finland lead the world with countries such as the United States and Sweden scoring around the OECD average. Where developing countries have participated they have generally scored below the average (for example, Chile, Tunisia and Peru).

The TIMMS 2011 mathematics results also confirm some relative international rankings. The lead of some Asian countries is evident. The Republic of Korea, Singapore, Chinese Taipei and Hong Kong lead with Finland again leading among Western countries. Two southern African countries, namely South Africa and Botswana, had their grade 9 students write the grade 8 assessment. Ranking is again well below the average and confirms the relative standing of South Africa and Botswana in terms of educational outcomes: Botswana scored 397 against the TIMMS centrepoint of 500 and South Africa 352 (see http://timss.bc.edu/timss2011/downloads/T11_IR_M_Chapter1.pdf).

Table 1.4 Programme for International Student Assessment (PISA) 2009 country average scores for science

Scale score	Country score	Country
580	575	Shanghai–China
570		
560	554	Finland
550	549	Hong Kong–China
	542	Singapore
540	539; 538	Japan, Republic of Korea
	532	New Zealand
530	529, 528, 527	Canada, Estonia, Australia
	522	Netherlands
520	520	China, Taipei, Germany, Liechtenstein
	517, 514	Switzerland, UK
	512, 511	Slovenia, Macao–Chian
510	500, 507	Poland, Ireland, Belgium
	503	Hungary
	502, 501	USA, OECD Avg.
500	500, 499	Czech Republic, Norway, Denmark
	498, 496, 495	France, Iceland, Sweden
	494, 493	Austrai, Latvia, Portugal
490	491, 490	Lithuania, Slovak Republic
	489, 488	Italy, Spain
	486, 484	Croatia, Luxembourg
480	478	Russian Fed.
470 and below	455–330	Greece, Dubai-UAE, Israel, Turkey, Chile, Rep. of Serbia, Bulgaria, Romania, Uruguay, Thailand, Mexico, Jordan, Trinidad and Tobago, Brazil, Colombia, Rep. of Montenegro, Argentina, Tunisia, Kazakhstan, Albania, Indonesia, Qatar, Panama, Azerbaijan, Peru, Kyrgyz Rep.

Source: National Center for Education Statistics (US) http://nces.ed.gov/surveys/international/

Also for the wealthier countries the lack of a clear relationship between inputs and educational outcomes hold. For example, looking at learning outcomes relative to inputs for high income countries, Dobbie and Fryer (2011), for example, point out that around 2010 'the United States spends US$ 10 768 per pupil on primary and secondary education, **ranking it fourth among OECD countries**. Yet, among these same countries, American fifteen year-olds rank **twenty-fifth in math achievement, seventeenth in science, and twelfth in reading**'.

1.3 Conclusions about efficiency and inefficiency in education

Based on extended analysis of the growing data, there is a strong consensus that inefficiencies abound in education systems in both developed and developing countries. In 2002 Glewwe

concluded that 'there is ample evidence that many schools in developing countries are not very effective, and operate far from any conceivable efficiency frontier'.

Earlier work on the Middle East and North Africa (World Bank) concluded that 'enough money' is available for education but 'used to pay the salaries of more teachers than those who actually teach, to finance construction of schools located without regard to student habitations and, ultimately, to produce students who do not learn math and science at international standards, and who possibly do not learn how to learn'.

More recently in their extensive study on education in SSA Majgaard and Mingat (2012) also warn that more school attendance in Africa has not been sufficient to enhance numeracy and literacy scores and 'increase productivity in the workplace'. They point out that 'international test score data show that student learning outcomes are often poor in sub-Saharan Africa'. Their index of learning implies that 'students absorb and comprehend only 45% of the curriculum at the time of testing' and that 'only three out of four adults who completed six years of schooling can read'.

The implications are clear that there is significant wastage and inefficiencies in schools in Africa, and that those will make it difficult to reach educational objectives with the available resources.

1.4 A note on definitions and the policy framework

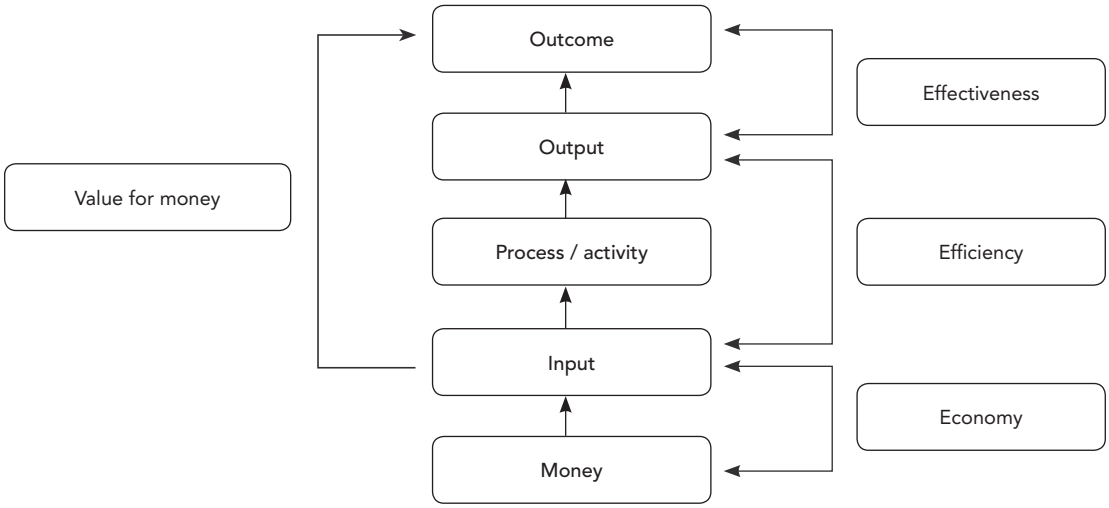
In the foregoing, the concept of efficiency in education has been used fairly loosely. In speaking of education efficiency the understanding is that of a production process where funding or money is being used to buy certain goods and services (teachers, administrators, support staff, textbooks, stationary and other learning materials, facilities and technology). Boissiere (2004) refers to 'hardware' (school buildings, classrooms and furniture, sanitation, etc.), 'software' (curriculum, pedagogy, textbooks, writing materials, etc.), teachers and 'management and institutional structure'.[1]

These inputs are combined into certain activities or processes (planning, teaching, assessing) which produce outputs (number of years of schooling completed, educational attainment). Outputs are, however, not ends in themselves, but means to the ultimate goal of education, namely a literate, numerate and productive workforce.

In this results chain (set out in Figure 1.2) efficiency is defined as the relationship between inputs and outputs while effectiveness depends on whether the outputs actually translate into outcomes. It is then indeed Majgaard and Mingat's (2012) conclusion (quoted above) that quite often the outputs produced (years of schooling, for example) in SSA do not produce the required outcome (a numerate and literate population).

1 Indeed, the education production process is more complicated than reflected in this simplified results chain. Boissiere refers to 'context and background variables' (student academic ability, family and community background as a fifth category of 'inputs'. Empirical studies often capture this as a socio-economic status (SES) and these factors also influence the demand for education. In addition most education inputs go through their own production processes (for example, teacher training, school building, textbook development, printing and distribution) which add complex sub-processes to the education production processes.

Figure 1.2 The results chain and definitions of efficiency and effectiveness



Source: Rawle (2008) based on UK Comptroller and Auditor-General, 2001

While some inputs and outputs make a big difference or, in other words, are efficient or effective, they may be very expensive and thus unaffordable or at least cost-inefficient or cost-ineffective. For the purpose of policy advice it is therefore important to also focus on the relative cost of different interventions. This requires four steps, namely (1) 'estimating the impact of alternative school inputs or processes'; (2) analysis of the cost of the intervention; (3) the calculation of cost-effectiveness ratios; and (4) having comparable studies of cost-effectiveness of other interventions in order to be able to assess relative cost-effectiveness (see Mingat & Tan 2003; Dhaliwal et al. 2011). Having methodologically comparable impact assessments for different interventions as well as detailed and consistent cost information is, however, normally quite a challenge.

While the results chain assists in clarifying what is meant by efficiency and effectiveness, it does not adequately provide a scheme of the role of policy in generating improved outcomes. Figure 1.3 identifies a number of outcomes of the education system, namely numeracy and literacy (cognitive ability of students), creative and emotional skills, values, labour market preparedness and social benefits (based on EFA 2005). In order to reach these outcomes there are intermediate objectives, namely to provide access to schooling of a good quality and to do so efficiently.

A number of levers exist to improve access, quality and efficency. They can be summarised as follows (Roberts, et al. 2002):

- Financing refers to 'mechanisms [or institutions] for raising the money that pays for activities' in the education sector and 'the design of the institutions that collect the money'. This includes the relative balance between public and private funding (including school fees) and how the public funding is collected (general or earmarked revenue).

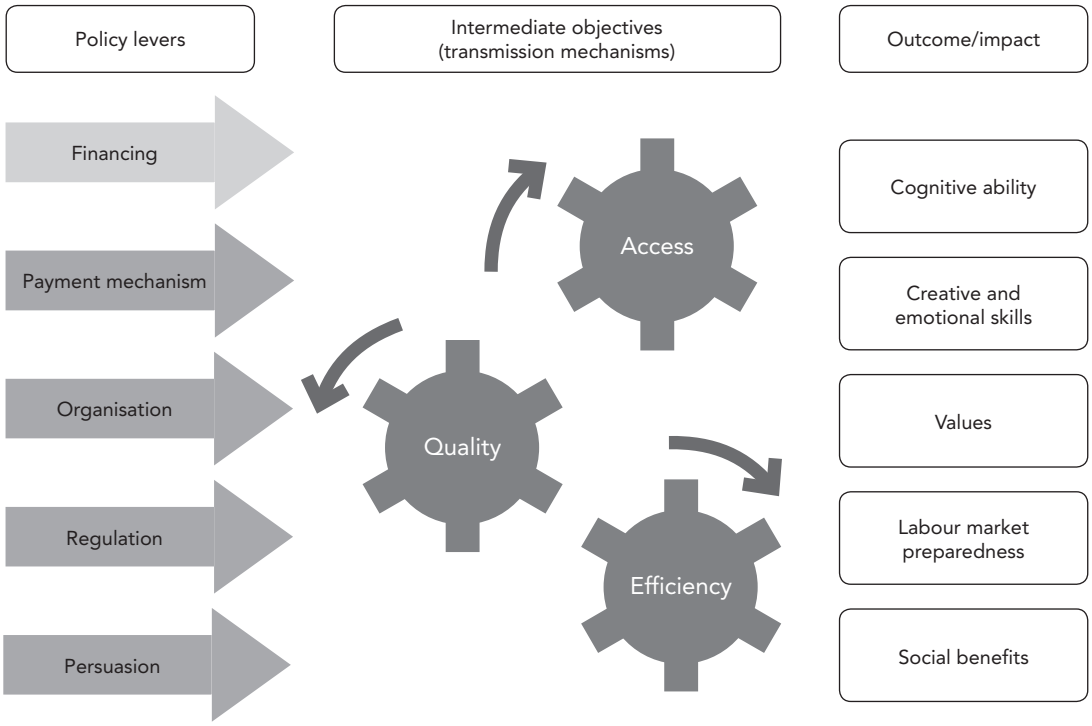
- Payment refers to the 'methods for transferring money to … providers' (such as schools, district offices and universities). Possibilities are funding-in-kind (teacher salaries, textbooks delivered, payment of utility bills and maintenance) or cash grants. The basis on which funding is provided is critical whether it is per learner, per-learner adjusted or based on performance or special needs.

- Organisation has been described as including 'who does what and who competes with whom, as well as the managerial aspects of how providers work internally, such as how managers are chosen and how employees are rewarded'. This area includes mechanisms affecting competition, decentralisation and direct control of providers and thus the whole accountability system. In addition to the structure of the education system, we also need to factor in the broader public financial system (which typically sets the framework for planning, prioritisation, budget implementation and reporting) within which the education system operates. These institutional structures, together with the payment mechanism and regulations in place form the accountability structure.

- Regulation is the use of the coercive power of the state to get actors to change their behaviour, and this power may be delegated to non-state actors. Regulation is critical to the functioning of markets – effective public action is a complement to effective private action.

- Persuasion includes efforts (outside the area of laws and regulations and direct incentives) to influence the behaviour of citizen service providers. It could include mass media campaigns to promote parent involvement and school management committee (SMC) participation, appeal to teachers and principals and engagements with trade unions and the business sector.

Figure 1.3 Policy levers and improving outcomes



Source: Adjusted for education sector from Hsiao (2003) and Roberts, et al. (2002). Education outcomes from EFA (2005)

The rest of this paper firstly elaborates some perspectives and evidence on efficiency in education, looking mostly at the school effectiveness literature, and then proceeds to assess, in the light of the evidence what policy levers are available and how they can be used to improve efficiency in education.

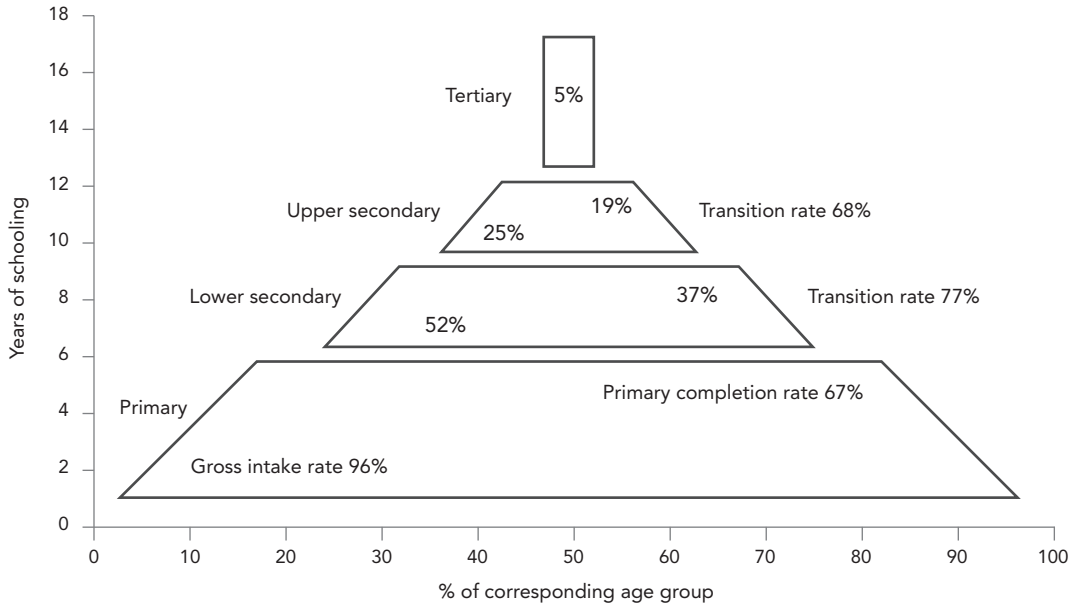
2. Internal efficiency

'Internal efficiency' focuses on entry and flow of learners through the education system. Learners enter at the lowest grade and in subsequent years can be either promoted or repeat or drop out. A fully efficient system is one where all children enter school at the appropriate age and complete each cycle without repeating a year or dropping out (see Rawle 2008).

Analysis of internal efficiency is a relatively straightforward diagnostic tool, identifying potential areas of wastage and therefore policy areas to focus on. ERA (2006) argues that advantages of internal efficiency analysis are its 'measurability and analytical clarity'. It provides a number of initial indicators of the efficiency of an education system.

Figure 2.1 provides one picture of learner flows in SSA and hence some indicators of efficiency. It shows that initial access or intake is high but that there is high dropout resulting in a primary completion rate (the proportion of the relative age group completing primary school) of only 67%. Approximately 30% of a cohort therefore drops out. Only 77% of those completing primary transitions proceed to lower secondary and the dropout rate is again just under 30%. Given that only 19% of the age cohort completes upper secondary, the overall dropout rate is more than 80%.

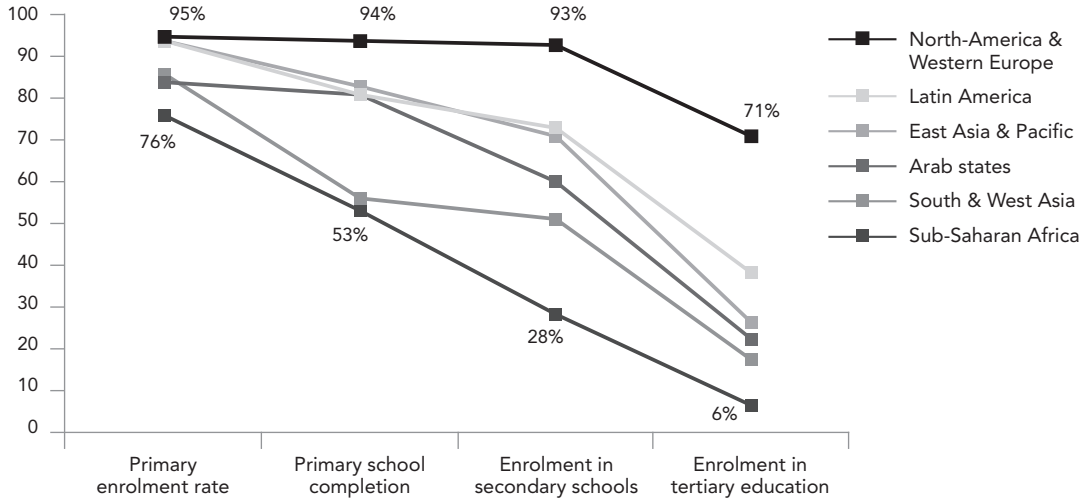
Figure 2.1 Sub-Saharan Africa's education pyramid, ca. 2009



Source: Majgaard and Mingat (2012)

Figure 2.2 puts some of these indicators in international perspective. It shows that while access and enrolment in SSA has improved substantially and 75% of the relevant age group is in primary school, this lags behind other regions significantly. In addition to this, primary completion is much lower than in all regions except South and West Asia. SSA lags behind South and West Asia in terms of secondary enrolment (significantly) and in tertiary education (to a lesser extent).

Figure 2.2 Entry and flow through the education system – regions compared (%)



Source: http://www.brookings.edu/research/interactives/africa-learning-barometer based on data from the 2011 UNESCO Education for All Global Monitoring Report

A very high-level analysis of such internal efficiency in African education (which did not do enough justice to diversity between countries) raises at least three issues:

- Majgaard and Mingat (2012) point out that a significant part of the dropout rates in schools comes from 'within-cycle exits' rather than from low transition rates to a next phase. They indicate that the strategy to address this problem of retention will have to be different from that of increasing access where the focus was on school fees, building more facilities and making available more teachers. Rather the focus will have to be on addressing the demand for schooling more directly, and improving quality (also partly to impact on demand).

- Repeater rates in SSA are high, especially in low-income countries where they range from 2–29%, with the proportion of repeaters in the system averaging 15%. Partly because repetition increases the cost of education relative to its benefits and signals potentially lower benefits, it has an impact on retention. Reducing repetition as well as making available more full-phase schools are seen as potential strategies to enhance retention (Wechtler et al. 2007; Majgaard and Mingat 2012).

- The low senior and secondary and tertiary enrolment (with increasing primary and lower secondary completion) points to the massive pressures that will be faced for the quantitative expansion of the education system, while universal enrolment in good quality primary education is not yet a reality. This will make significant financial demands but also demands on planning and prioritisation systems, and management and human resource capacity. Such pressure could further impact on quality and efficiency in the education system.

While the analysis of internal efficiency therefore points to a number of threats and areas which need attention (and in particular outline the quantitative challenges to a system), it has certain shortcomings which point to the need for the analysis of allocative and technical efficiency (such as not looking at costs and quality issues). For planning and budgeting it is, however, critical that finance and education departments have a clear view of flows and anticipated flows – it provides the framework for planning and strategies to improve efficiencies. Indeed, a major constraint on effective planning and budgeting processes is that good data both on

population trends and enrolment and related schooling trends are not available. Improving efficiencies without good and detailed demographic and school information is impossible. There is ongoing work on improving simulation models which use basic demographic realities and information about the education system to project future possibilities in terms of enrolment and flow through the system.

Box 2.1
Dealing with internal inefficiency and repetition in Brazil

[I]n 1996, for every 100 18-year-olds, only 66 completed fourth grade, 43 completed eighth grade, and barely 25 finished secondary education. High repetition rates meant that students completed the 8-year basic cycle in more than 10 years, and they took another 4 years to complete the 3 years of senior secondary schooling. Consequently, although gross enrolment secondary rates were high, net enrolment rates were very low, especially at the senior secondary cycle (30%). Low quality of schooling resulted in high dropout and repetition rates of the poorest students.

Since 1996, Brazil has noticeably improved its secondary education system, especially the junior secondary cycle. In 1998, the Fund for the Maintenance and Development of Basic Education and Teacher Appreciation (FUNDEF) ***tied the allocation of municipal and state education funds to enrolment***. Consequently, poor municipal governments gained access to greater resources and enrolment increased by 6% at the junior secondary level. A similar program for senior secondary education is now being considered. Bolsa Escola, ***a means-tested cash transfer program***, was implemented in 2001, providing cash payments to poor families whose children enrol and stay in school. One study finds that Bolsa Escola may have increased attendance among children ages 10 to 15 by up to one-third.

Since 1996, the central government has also taken steps to address other constraints on the expansion of secondary education.

- Availability of qualified teachers. All teachers are expected to have completed at least secondary education. A federally funded distance teacher-training program, PROFORMAÇÃO, provides training to teachers in the poor northern and north-eastern states.

- Excessive grade repetition. ***This constraint is addressed through summer school, monetary graduation incentives and accelerated instruction programs, learning cycle approaches, flexible promotion based on academic credit mechanisms, and other programs designed to improve efficiency***.

- Lack of assessment data. The government ***reopened the National Institute for Educational Research, which now implements national educational assessments of student performance through the Basic Education National Evaluation System and an exit examination that tests graduates on the senior secondary curriculum***.

Source: Verspoor (2008) (bold italics added)

3. Allocative efficiency: Does funding flow to priority areas and groups?

The notion of allocative efficiency is less easy to fit into the schema of the results chain but is an assessment of whether resources are used in the highest impact activities or priorities. Typical measures which can point towards issues with regard to allocative efficiencies include the proportion of spending going to a specific activity (such as education spending as a proportion of GDP) and the distribution of funds between levels of education, specific education and related activities and different income groups (which is then also an indication of equity).

With regard to the spread of funding among levels of education, Abagia and Odipo (1997) refer to the World Bank's assertion that 'despite indications that the rates of return from basic education are generally higher than from higher education, most African countries still invest more resources in the latter'.

Both Boissiere (2004b) and Winkler and Sondergaard (2008) have raised questions about the focus on universal primary education no matter what the quality. Boissiere argues that two alternative routes can be identified: a 'big bang' expansion of access to primary and then attention to quality after universal enrolment has been reached or a more gradual focus on improving the skills acquisition of those currently in the primary system and then an expansion of the primary system. He refers to evidence that it is the quality of education (cognitive achievements) and not years of schooling which impacts on growth. He also reads the historical record and the experiences of China, India and Europe potentially pointing to merits for 'developing the higher education sectors well before achieving UPE'. In an assessment of efficiency in the Ugandan education sector Winkler and Sondergaard (2008) argue that '[a] careful assessment of the costs and benefits of raising quality at the lower primary level versus raising access at the post-primary level would help guide MoES resource allocation'.

Table 3.1 Allocation decisions: Suggested sub-sectoral budget shares and estimates for some country groupings and African countries

	Benchmarks for SSA		Estimated actual				
	Latham et al. (2006)	Verspoor (2008) – projection for 2015	SSA UNESCO 2010 (median)	Developed countries UNESCO 2010 (median)	Latin America UNESCO 2010 (median)	Ghana UNESCO 2010	Mali UNESCO 2010
Pre-primary	0–5%		0.3%	9.0%	7.4%	7.3%	0.8%
Primary	50%	42–64%	46.0%	24.2%	36.9%	34.8%	39.9%
Secondary	20–25%	25–30%	27.5%	41.7%	31.8%	35.1%	40.7%
Junior sec. (% of sec)		55%					
Senior sec. (% of sec)		45%					
Higher	15–20%		18.5%	22.1%	18.8%	22.9%	18.7%
Non-formal	0–5%						
Total	100%					100%	100%

Source: Latham et al. (2006), Verspor (2008) and the UNESCO database

Latham et al. (2006) identified an important reform challenge in Africa as the need to establish a '[b]alanced sub-sectoral allocation of resources' and continued to argue that '[s]ome countries in Africa skew scarce resources towards expensive technical education or higher education which often serves a very small minority at high cost, leaving less of the budget to allocate towards basic education where several million students are often studying in large classes with very few educational resources'.

Verspoor (2008), after analysing trends in other regions of the world argues that the historical record argues for '[t[he balanced development of different subsectors of the education system [as] a bottom-up process. Broad access to primary education of acceptable quality must be in place for successful development of secondary education. This does not mean the process must be fully sequential, but it does imply that policy and public resource allocations must shift upward gradually.' He does, however add the condition that '[h]ow resources are spent is as important as the amount. The role of government must be clearly defined, policy choices must be pragmatic and evidence based, and public resources must be used efficiently and allocated to inputs with the most cost-effective impact on learning.'

Both Verspoor (2008) and Latham et al. (2006) proceed to propose some benchmarks ('best practice budget shares') for SSA countries. Table 3.1 provides their proposed benchmarks and some recent evidence form the most recent UNESCO database.

Latham et al. (2006) conclude that 'the reality in some sub-Saharan countries is that primary education receives around 35%' (rather than the 50% 'best practice') and 'secondary and tertiary receiving 55–60% between them' (Latham et al. 2006).

The most recent summary evidence on spending between different levels of education in SSA in comparative perspective is provided in Table 3.2.

Table 3.2 Allocation decisions across country groupings

		SSA low income (30 countries)	Other low income (6)	SSA middle income (5)	Other middle income (20)	High income OECD (22)
Primary	Average	47%	42%	27%	43%	26.0%
	Range	[21–66]	[23–59]	[17–38]	[30–66]	[20–34]
Secondary	Average	30%	38%	44.0%	33.0%	44.0%
	Range	[12–66]	[24–44]	[30–68]	[12–45]	[35–50]
Higher	Average	18%	17%	21.0%	19.0%	24.0%
	Range	[4–39]	[12–23]	[11–32]	[6–44]	[13–34]

Source: Majgaard & Mingat (2012) based on UNESCO Institute for Statistics (UIS) data

Higher secondary spending by SSA middle income compared to low income show the future path of low-income countries as secondary enrolment expands. Middle-income countries outside the SSA region still allocate most of their budgets to primary education in contrast to SSA middle-income countries. This may in part be explained, as noted below, by their relatively high per-student cost of secondary education in SSA. In the OECD countries where public secondary schooling is generally provided free of charge, secondary education consumes, on average, more resources than either primary or higher education. Large variability implies that countries have much room to manoeuvre (scope for redirecting) in terms of the allocation of their public spending across different levels of education. It is not clear in which direction they could or should manoeuvre/redirect (Majgaard & Mingat 2012).

Allocative efficiency is supported through a sound budget formulation/expenditure programming process which builds on an informed planning cycle. Here a key requirement is that the budget takes into account priorities and in this sense is 'policy-based'. In order to assess appropriateness it is also important that the appropriate information is available with regard to composition of expenditure. The second column of Table 3.3 below provides some of the criteria for the budget formulation and an approval phase, which are contained in the indicators of public financial management performance in the Public Expenditure Management and Accountability Framework.

Table 3.3: Components of the budget cycle and performance criteria

Phase of budget cycle	Budget formulation and approval	Budget implementation	Monitoring and reporting
Key principles	Sound programme classification and clear objectives/targets	Predictability in availability of funds	Quality and timeliness of in-year budget reports
	Feedback from performance information – establishing a link between use of allocated resources and subsequent allocations	Effective payroll controls	Availability of performance data and indicators
	Multi-year perspective	Price competitiveness, quality control and timeliness in procurement	Quality/timeliness of annual financial statements and annual reports
	Policy informed budgets	Effectiveness of internal controls	Effective external audit and follow-up
	Public access and transparency		

Source: Adjusted from PEFA Sectretariat (2011)

In addition to an imbalance in spending on different levels of education or input types (and on certain complementary activities such as school transport and nutrition), education spending is often not equitable. As Bruns et al. (2011) indicated, government education spending often 'benefits the rich rather than the poor'. A recent analysis showed on the one extreme South Africa in 2000 where the poorest 20% receive about 30% of public education expenditure and the richest 20% less than 10%. In contrast, in Mozambique in 2003, for example, the poorest 20% of learners received about 15% of education spending while the top 20% received more than 30%. In Tanzania the top 20% claimed more than 35% of public education spending in 2000 while the poorest 20% took less than 10% (Bruns et al. 2011).

But as Bruns et al. (2011) point out, the case of Malawi illustrates that public policy choices can transform a highly regressive pattern of expenditures into an equitable one, as Malawi did between 1990 and 1998. This is also a lesson from the South African experience around the coming of democracy, that the equity of funding can indeed be improved fairly dramatically. However, sometimes because of greater inefficiencies in the poorer school, equalising resources do not translate as easily into greater equity in outcomes.

4. Technical efficiency

Technical efficiency 'looks at how economically inputs are converted into outputs' (Rawle 2008).[2] However, quite often efficiency and effectiveness (the relationship between inputs/outputs and outcomes) will not be clearly distinguished. Here the words efficiency and effectiveness are used interchangeably. Cost-efficiency and cost-effectiveness refer to the relative efficiency of two or more approaches after having factored in the cost of inputs.

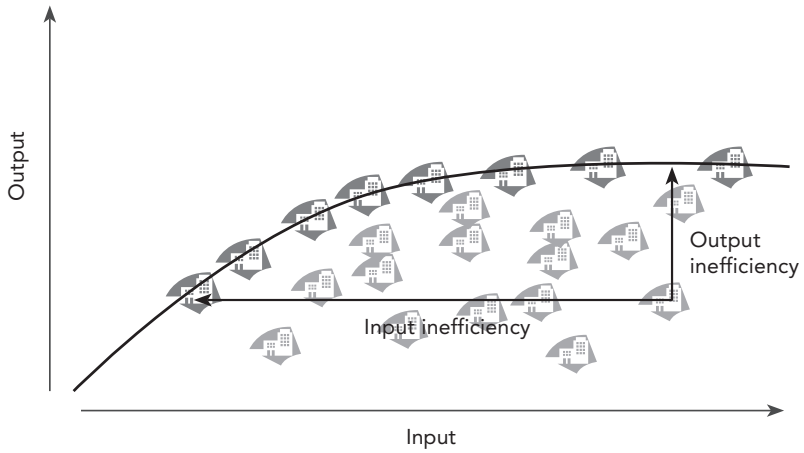
In this section we discuss how efficiency and effectiveness measurement have been approached in the (mostly economic) literature and the main conclusions of the literature. Economy refers to the absence of waste in procurement and can, for example, be assessed by comparing the unit cost of various inputs such as an average classroom, textbooks and teachers.[3]

4.1 Data envelopement analysis: Comparing to what is possible

One way of illustrating the concept of efficiency is through the data envelopment analysis (DEA). This tool is often used to compare the efficiency of service providers. It compares for different providers their inputs and outputs and for each level of input determines those who are most efficient, that is, produce the most. These producers then form the possibilities frontier and are denoted as efficient and other producers compared to this 'maximum'. The ratio of inputs to outputs can then be seen as an 'efficiency quotient'.

In Figure 4.1 the producer identified is output inefficient in the sense that others produce bigger outputs with the same inputs. It is also input inefficient (inputs are wasted) because others can produce the same output with much smaller inputs.

Figure 4.1 Illustration of an efficiency frontier for different producers



Source: Schleicher (2010)

The DEA has been used extensively in health and less so in education. Its recent use has been in comparing OECD countries (see Schleicher 2010, ERA 2006) and universities within countries (St Aubyn et al. 2008). While a World Bank (2007) study on Peru analysed school efficiency using the DEA, examples of this analysis for African countries has not been found.

2 'In a general sense, education provision is efficient if its producers make the best possible use of available inputs. An education system not being efficient would mean either that results (or 'outputs') could be increased without spending more, or else that expense could actually be reduced without affecting the outputs, provided that more efficiency is assured' (ERA 2006).

3 'Economy measures the absence of waste in the procurement process and involves the conversion of money into inputs in the education system' (Rawle 2008).

Efficiency coefficients have been calculated for OECD countries by relating PISA assessments to inputs ('teaching and computing resources, student socio-economic status and language background'). These rankings are led by Korea and Japan with efficiency coefficients well above 0.8, followed by three smaller. Norway, Greece and Iceland are ranked bottom, just below the US with efficiency coefficients of between 0.7 and 0.75 (Schleicher 2010).

European countries and some comparators have also been ranked in terms of primary and secondary expenditure as a proportion of GDP compared to educational attainment (measured as the proportion of 20 to 24-year-olds who have at least upper secondary education). Roughly the efficiency frontier can be seen as being mapped by Norway, Czech Republic, Slovakia and Romania. Iceland, Portugal and Malta would seem quite inefficient on this ranking. There is a significant clustering around the average, where we find countries such as the UK, US and Finland (ERA 2006).

While the DEA method is very useful from some perspectives, outliers can influence the analysis and further analytical work is needed to explain the outcomes. As a result it is sometimes complemented with regression analysis (see ERA 2006).

4.2 Analysing efficiency and effectiveness in education

There is a range of literature analysing the efficiency of schools and schooling systems. Heneveld and Craig (1996) identified the two main traditions, namely 'effective schools research' and 'schools improvement research'. They described 'effective schools research' as using 'quantitative input-output analyses of data [production function analyses] from large scale surveys' to identify significant system-wide variables. But it does include analyses of school processes when they can be quantified. 'Schools improvement research' is described as 'qualitative in-depth case study methods to understand process variables within schools more fully, including an understanding of which inputs are most significant'. Other, some more recent, approaches to effectiveness in education are randomised control trials, natural experiments and benchmarking.[4]

4.2.1 Production function studies

The production function approach to identifying what works in education dates from the 1960s and the literature is vast – with a number of surveys of methodology and results (see for example, Heneveld and Craig 1996; Glewwe 2002; Boissiere 2004). Because of the vastness of the literature, coverage must be selective. Here we provide a brief overview of methodology and then focus on key conclusions and lessons.

As one of the key proponents of this field of study explained, 'educational production functions (also referred to as 'input-output' analysis or 'cost-quality' studies) examine the relationship between the different inputs into and outcomes of the educational process' (Hanushek 1986).

4 Dobbie and Fryer (2011) divide the literature on increasing educational efficiency into three groups: '(1) evaluations of market based mechanisms such as school choice and school vouchers [market-based reforms] (2) quantitative attempts to link school inputs to student performance [school inputs] and (3) qualitative analyses of the strategies embedded in effective schools [case studies of effective schools]'. Glewwe (2002) distinguishes between (1) 'conventional studies' (attempts to 'estimate educational production functions' or the relationships between inputs and outputs/outcomes); (2) 'randomised trials' where 'the basic idea is … to compare two groups of observations that have no systematic differences other than the one group received the "treatment" and the other did not' ('a series of randomised trials, one per school characteristic, to evaluate the impact of changes in school and teacher characteristics on learning'); and (3) 'natural experiments' through 'finding "natural variation" in a school characteristic that is uncorrelated with virtually anything else that determines learning'. Boissiere (2004) also distinguishes between (1) 'the production function approach'; (2) randomised evaluations; and (3) natural experiments, but adds (4) 'comparative benchmarking' or finding rules of thumb or average parameters that can be used to assess policy (say with regard to levels of spending, composition of expenditure, etc.) and (5) 'qualitative methods' focusing on 'critical qualitative details such as the teaching-learning process in the classroom'.

Most commonly the output variable would be some measure of cognitive achievement (or change in cognitive achievement) quite often the results of standardised test scores. Inputs would include various, what Majgaard and Mingat (2012) called, 'observable schooling conditions'. They identify three categories of inputs:

- Teachers' academic credentials and training, class size, modality of student grouping;
- School characteristics such as location and size;
- Availability of textbooks and pedagogical materials (which largely depend on available resources).

Table 4.1 provides a list of the inputs which are commonly tested for in the production function literature. While the emphasis of different review authors is different, the findings can be summarised as follows:

- Observable schooling conditions or physical inputs ('hardware', 'software', teachers and other human resources) generally make little difference to student outcome when added to beyond a basic minimum. This has been described as pointing towards the 'failure of input-based schooling policies' (Hanushek 1986; Majgaard and Mingat 2012).
- The implication is that schools are inefficient in that they use inputs and input quantities that do not make a difference to outputs, and that there is room for improving efficiency. Just throwing more resources at education, without ensuring that these are appropriately used in the education process will not help (Glewwe, 2002).

Table 4.1 Overview of findings of various production function studies: Proportion of cases in which specific input was found to be significantly positive

Specific inputs	Fuller ('94)	Harbison/Hanushek ('92)	Velez ('93)
School facilities		67.4 (34)	32.9 (70)
Textbooks	73.1 (26)		76.5 (17)
School libraries	88.9 (18)		
Class instruction time	81.8 (17)		
Homework frequency	81.8 (11)		
Pupil-teacher ratio	34.6 (26)	26.7 (30)	9.5 (4.3)
Teacher education	50 (18)	55.6 (63)	45.6 (68)
Teacher experience	56.6 (23)	34.8 (46)	40.3 (62)
Teacher salary	36.4 (11)	30.8 (13)	

Note: First number indicates percentage of cases in which the variable is significantly positive. Second number in paretheses is the number of cases in that review study. Blank cells show data was not available

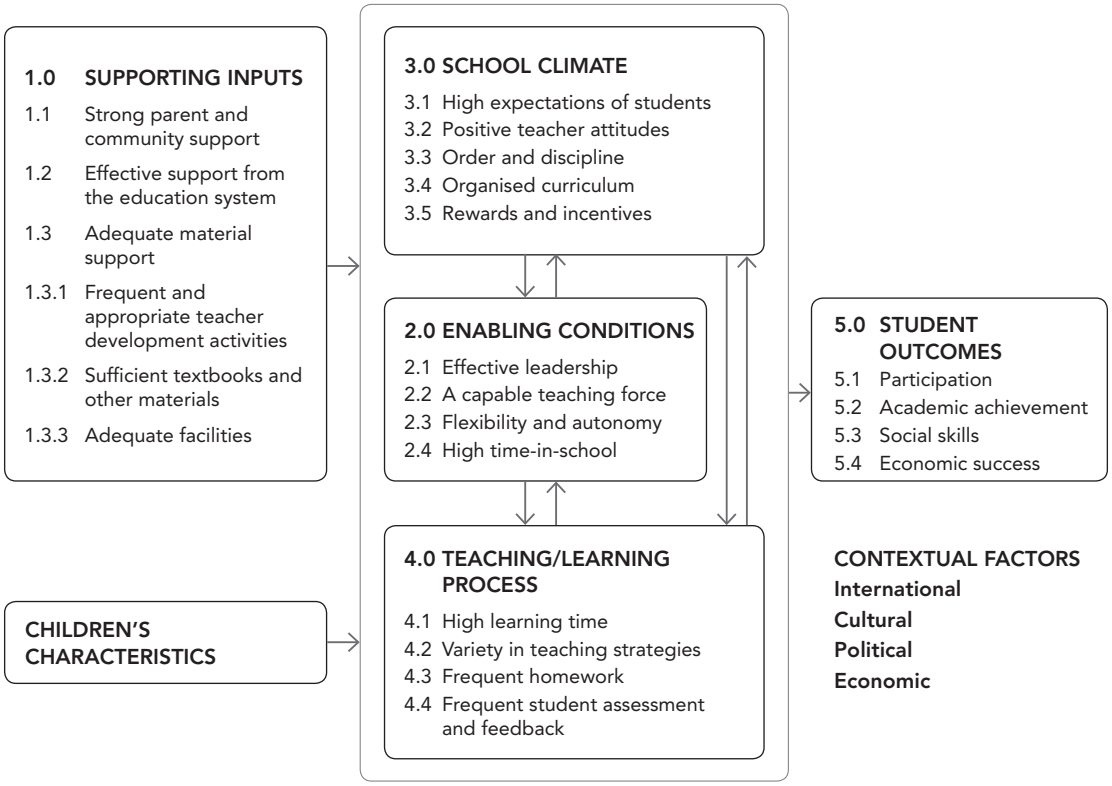
Source: Boissiere (2004)

In spite of this general conclusion of resources not being sufficient to improve education, context is important. In this regard the very low level of certain inputs in some developing countries may make additions to spending necessary. And certain aspects which are of little importance in wealthy countries because they are generally in place will be an issue in developing countries. Examples are learner nutrition and health, textbooks and other learner support material and an appropriate language of instruction (see Heneveld and Craig [1996] and School of Education and Development Studies [2010]).

A further implication of the fact that inputs are not sufficient for good school outcomes is that a lot depends on 'what goes on the classroom' (Heneveld & Craig 1996; Majgaard & Mingat 2012), that is, how the various inputs are transformed into learning inside the classroom. This type of thinking, with the help from more qualitative studies, has led to putting 'school factors', consisting of 'school climate, enabling conditions and the teaching/learning process' central to models of improving education. The Heneveld and Craig (1996) scheme (see Figure 4.2) therefore provides a prioritisation of focus areas in the wake of findings that inputs are less central than sometimes thought.

A final inference from the literature is that because so small a portion of variability is explained by inputs and because quality education depends on getting such a large number of complementary factors to work together, the incentive structure and accountability system for actors are critical. This requires getting right the institutional structure (allocation of responsibilities, reporting, information) of the educational system.

Figure 4.2 Heneveld and Craig's (1996) conceptual framework of factors that determine school effectiveness



While the production function studies therefore in general underplay the importance of input increases in improving education, some findings about specific inputs are quite robust and could help countries to prioritise. An early overview of results is provided in Table 4.2 (Boissiere 2004). It lists the percentage of cases from specific studies where an input category has been found to be statistically significant. These findings are broadly corroborated by more recent reviews such as that of Wechtler et al. (2007) and Majgaard & Mingat (2012). The findings also include that:

- Class size (measured by the learner–teacher ratio) is not that important once beyond a certain minimum level of 1 to 60 or 50. While reducing classes sizes below 30 can have an impact, it is not cost-effective and is unaffordable for most countries in SSA.

- School infrastructure and facilities can make a difference, partly through improved attendance, but it is expensive and cost-effectiveness should be assured both through improved procurement and through sticking to basic facilities.
- Also related to infrastructure availability, it has been argued that multi-shifting should be avoided (because it tends to reduce instructional time), that as far as possible schools should offer a full school cycle (primary or secondary, because there is evidence of greater dropout from feeder schools) and multi-grade teaching can be effective but needs to be implemented with care.
- Textbooks and other learner support materials such as teacher guides and wall charts are fairly consistently evaluated as highly cost-efficient with the provisos that they must be appropriate (standard/context) and that teachers must have the capacity to utilise them properly. Majgaard and Mingat (2012) conclude that 'evidence supports a student-textbook ratio of 1 to 1'.
- Appropriate teacher salaries are important but it is not always quite clear what the implications are. Boissiere (2004) argues for a balance to ensure that salaries are high enough to attract appropriate people but not too high to make broader access impossible. Pritchett and Filmer (1997) found teacher salary increases to be very cost-ineffective relative to school facility improvement and instruction material. Most commentators refer to the need to experiment with performance incentive systems but there is little evidence on successful strategies. This will be discussed further in the next section.
- On teacher, knowledge, skills and training, the 'evidence is somewhat complicated and mixed' (Boissiere 2004; also see Wechtler et al. 2007), but also because it is such a multi-faceted area. In-service training is given the nod, ahead of expensive, long duration pre-service training. On teacher qualifications and knowledge, the evidence is contradictory.
- A critical matter that comes out in most studies is that time on task is critical – that makes use of time in the classroom and (often high) learner and teacher absenteeism a critical matter. The latter also speaks to incentives and motivation and monitoring – issues that are being addressed in the section on reform and institutional structure.

4.2.2 Other approaches to assessing effectiveness and cost-effectiveness

For some time, and partly because of the methodological problems with production function type studies, the use of randomised control trials (RCT) has been recommended to assess the cost-effectiveness of alternative education policy options (see Glewwe 2002). Randomised trials 'compare two groups of observations [say two schools or two learners or two education districts] which have no systematic differences except that the one group received the "treatment" [say more textbooks or a cash grant] and the other did not'. While RCTs avoid some of the problems of production function analysis (such as relevant variables being omitted from the analysis, sample selection and measurement error) it has some its own problems (changing characteristics of households and individuals as a result of the intervention and sample selection).

Randomised evaluations have confirmed some of the conclusions of the production function analysis (especially with regard to textbooks and materials), although it also raised some caveats about level of the books and their use (Glewwe 2002). Recent evaluation by the Poverty Action Lab also points to cost-effectiveness of interventions that are in some sense 'outside' the education system such as providing information to parents about the returns to education, iron fortification and de-worming (see Dhaliwal et al. 2001).

Less common approaches to assessing effectiveness of schooling systems are benchmarking and natural experiments. Examples are provided in Table 4.2 and Box 4.1.

Table 4.2 Suggested benchmarks for primary education efficiency and quality

Variable	Sample range	Adjusted sample	Highest-completion countries	2015 benchmarks
Service delivery variables				
Average annual teacher salary (multiple of GDP per capita)	0.6–9.6	4.0	3.3	3.5
Pupil–teacher ratio	13:1–79.1:1	44:1	39:1	40:1
Non-salary spending (% of total)	0.1–5%	24%	26%	33%
Average repetition rate (%)	0–36%	16%	10%	10% or lower
Finance variables				
Government revenue as a % of GDP	88.0–55.7%	19.7%	20.7%	14/16/18%
Education recurrent spending (% of government revenue)	3.2–32.6%	17.3%	18.2%	20%
Primary recurrent spending (% education spending)	26.0–66.3%	48.6%	47.6%	50%
Private enrolment (% total)	0–77.0%	9.4%	7.3%	10%

Source: Boissiere (2004) based on Bruns et al. (2003)

While benchmarks should seldom be seen as hard targets because country contexts and strategies differ, country comparisons to these can identify potential problems in country systems that would justify further investigations. For example, a high teacher annual salary relative to per-capita income (with Table 4.2 pointing to a benchmark of 3.5 for 2015) will indicate constraints on expanding education. The same is the case for low pupil–teacher ratio. Box 4.1 provides one example of a natural experiment focusing on two communities on different sides of an international border (Botswana/South Africa) and thus assumed to be very 'similar' (also in terms of 'primary school student population'). These communities are compared in terms of educational outcomes in order to assess the impact of different education systems. Another example (Boissiere 2004) is Duflo (2001), which isolated through complex statistical methodologies the effect of a very large school building programme in Indonesia on years of completed education and on wages. The analysis relied on exploiting differences in the number of schools built across regions and also the timing of the programme across the country.

Box 4.1
Findings from a 'natural experiment' – comparing Botswana and North West Province, South Africa

Our innovative approach is to exploit a 'natural experiment'. This natural experiment is based on the similarity of primary school student population, but differing school systems, on either side of the border in two southern African neighbours, Botswana and South Africa.

Our study provides carefully gathered information on student background, student learning, teacher knowledge and pedagogical skills, school environments, and the amount of mathematics actually taught to students during their grade 6 year in the Botswana-South Africa border region. This information is useful in a broad range of South African and Botswana primary schools servicing students of relatively modest socio-economic backgrounds, albeit confined to specific regions of the two countries. The systematic analysis of this information allows us to draw important conclusions regarding the role of teachers and teaching in students' learning. The method we use and the data collected make this a unique study of schooling. The details on learning, teacher skills, the schooling process and the schooling environment give us insights into what and how students in the two countries learn mathematics that go far beyond those in other studies of schooling, even most studies outside southern Africa. In addition the comparison of the schooling processes in a border area of the two countries help us draw much broader conclusions about school improvement strategies than are possible in single country studies.

Our analysis produced four major findings:

1. Grade 6 learners in Botswana have higher mathematic achievement gains than a very similar set of grade 6 learners in South Africa, but students in both countries learn mathematics at relatively low levels and make relatively small gains during the grade 6 year.
2. The pattern of learning mathematics is very similar in the two countries. Students in both countries mainly learn how to do operations rather than being taught the under-lying mathematics or how to reason mathematically. They also learn the same elements of the mathematics curriculum.
3. The differences in achievement gains are explained by the aggregation of small differences in teaching skills and the process of delivering education in the two countries. The results suggest that Botswana is able to produce higher achievement gains than is the case in South Africa because it has somewhat better teacher resources (knowledge and skills), because more lessons are taught and the curriculum is better adhered to.
4. Though teachers in Botswana schools are quite diverse in their mathematics knowledge, teaching skills, and the number of lessons they devote during the year to various items on our learner test, there is something more regularised about the process of teaching in Botswana. This reduces the variation in learner performance. In South Africa's North West Province, however, the variation in observed and unobserved classroom conditions appears to have a larger impact on learner gains, probably because classroom processes are more heterogeneous in South Africa.

Source: Extracted from Carnoy et al. (2012)

5. Education reform for efficiency

Education reform in both developed and developing countries has a long history. And a need to learn and extend successful approaches to a broader range of countries, but often also a dissatisfaction with results, has led to a range of reviews and efforts to distil essential elements or 'topographical road maps' (McKinsey and company 2009). As McKinsey indicated in their 2007 report on the best performing school systems, 'despite massive increases in spending and ambitious attempts at reform, the performance of many school systems has barely improved in decades'.

Some key reviews have been that of Heneveld and Craig (1996), which reviewed the effectiveness literature, and 26 World Bank education reform projects. They contributed a comprehensive conceptual scheme driving back the focus to what actually happens in schools, and how inputs are actually used in schools, rather than merely focusing on input categories. USAID has also regularly reviewed what they term 'education reform support' (Crouch & Healy 1997; De Stefano & Crouch 2006; and Gillies 2010). The latest report in this series (called '"The Power of Persistence": Education system reform and aid effectiveness') 'focused on the forces that influence how complex policy and institutional changes are introduced, adopted, and sustained in a society over a 20-year period'. Also recently, the McKinsey reports on top education performers and how they sustain their advantage have tried to distil key elements of education reform. Both the USAID and McKinsey reports draw attention to the common elements in reform processes but also the differences in implementation as a result of specific contexts.[5]

It is difficult to do justice to the extended literature and perspectives, but taking the lead from Majgaard and Mingat (2012[6]), three elements of reform are identified: (1) focusing spending on cost-effective inputs; (2) driving institutional change to enhance accountability and shape incentives; and (3) building country research capacity to provide more evidence on what works, both in terms of inputs and institutional change.

These three components are of course closely interrelated. For example, data, information and research provide the evidence on what works (both in terms of specific inputs and accountability reforms) while accountability reforms are necessary to ensure that appropriate inputs are utilised effectively.

5.1 Specifying key inputs

Education research for Kwa-Zulu-Natal Province in South Africa highlighted that countries (and often different regions within countries) are at different stages of education development. They referred to four phases of educational development (encapsulated by the proficiency of teachers in the system and the nature of teaching), namely, unskilled, mechanical, routine and professional. McKinsey (2009) more broadly distinguishes between poor, fair, good, great and excellent schools. Clearly context will have an impact on the cost-effective inputs. Specifically,

5 Gillies for USAID indicates that 'many of the initiatives and program activities are common to the operation of all education systems – curriculum, materials, teacher education and infrastructure' and that the 'five countries shared similar strategies for achieving the goals, in particular their focus on community participation, decentralization, and schools-based management as well as standards, testing, and accountability for student outcomes'. Looking at a quite different and larger range of countries, McKinsey (2009) 'identified a group of six interventions that occur with equal frequency across all performance journeys, but manifest themselves differently at each improvement journey stage: technical skill building of teachers and principals, student assessment, data systems, revised standards and curriculum, teacher and principal compensation and policy documents and education laws'.

6 In their chapter on learning outcomes, they state that '[This] chapter argues that the most promising avenues to improve learning may be (a) to direct education spending to high-quality inputs that have been found to be cost-effective in improving student performance and (b) to support these policies with better systems of accountability for teachers and schools'. Gillies (2010) distinguishes between politics, institutions, technology and human dimensions which need 'to align to enable behaviour change'.

in wealthier countries most of the basic inputs are already in place, while that cannot be assumed for developing countries. Therefore, when McKinsey looks at high performing systems, they can focus on teachers, their training and giving attention to the individual child as key markers of success and suggested focus areas (see Box 5.1).

Box 5.1
McKinsey (2007) on key education success factors

1. Getting the right people to become teachers: 'the quality of an education system cannot exceed the quality of its teachers';
2. Developing teachers into effective instructors: 'the only way to improve outcomes is to improve instruction';
3. Ensuring that the system is able to deliver the best possible instruction for every child: 'high performance requires every child to succeed' … and then leadership.

The McKinsey list assumes that a whole number of other inputs are in place, which is not necessarily the case for developing countries. Very basic matters (like inadequate child nutrition and health, and instruction time not being used as a result of teacher or learner absence or laxity) often require attention. Indeed child attendance often needs attention through demand-side measures. Box 5.2 provides a list more appropriate to most developing countries and the education development phase where they find themselves. This lists implies 'a return to the basics in grades 1 and 2, without which inefficiencies reverberate all through the education system up to university years' (School of Education and Development 2010 quoting Abadzi 2006).

Box 5.2
An 'input' list for developing countries

1. Supporting children's brain development and health;
2. Making effective use of available instructional time;
3. Ensuring that all have textbooks to take home;
4. Teaching fluent reading and calculation in the early grades;
5. Teaching basic skills in the home language;
6. Grounding teacher training in a few well researched learning principles that work indeveloping countries;
7. Ensuring effective teacher incentives, goals and oversight.

Source: School of Education and Development Studies (2010) from Abadzi (2006)

Box 5.2 also provides the link to the next section, because as previous sections have shown, ensuring that the right inputs are there does not ensure that they will be utilised effectively and combined in the right way. For this, the appropriate institutional and accountability systems must be in place.

Box 5.3
Definitions: accountability and related concepts

Standards are transparent and publicly known criteria or benchmarks used to assess and inform education policy, provision and performance.

Incentives are any financial or non-financial factors that motivate a specific type of behaviour or action, and can be positive or negative, i.e. encourage a certain behaviour or deter it.

Information in the form of clear definitions of outputs and outcomes combined with accurate data on performance and results collected at regular intervals enables sanctions to be imposed when specified standards are not met.

Accountability refers to the act of holding public officials/service providers answerable for processes and outcomes and imposing sanctions if specified outputs and outcomes are not delivered.

Source: Lewis and Petterson (2009)

5.2 Accountability

Ensuring that inputs are combined in the right way and that policies are implemented efficiently at all the different levels in education requires an appropriate institutional and accountability framework, providing the right incentives to individuals in the system to act. At least two things distinguish education services from other markets where the control of quality and efficiency is more straightforward. The educational product is complex[7] and accountability works indirectly: not directly between client and provider but from the provider (school) to agents (different levels of the state) to the principal (parent and child). Because of this indirect complexity 'a more complex system of incentives and accountability' (Bruns et al. 2011) is required.

In this regard World Bank (2007), in a study on Peru, identified key building blocks for an effective education system. Firstly, **standards** must be in place in the education system, secondly, **responsibilities and lines of accountability** must be clear and, thirdly, actors must have the capacity or support for actors to be able to **'come to standard'**.[8]

7 Bruns et al. (2011) state that 'education services are complicated. At the point of delivery – the interaction of teachers with their students – the service provided is highly discretionary, variable, and transaction-intensive. Discretionary, in that teachers must use their own judgment to decide what part of the curriculum to deliver and how. Variable, in that in a single classroom a teacher must customise services to a large number of different students with different aptitudes, motivations, and learning styles. Transaction-intensive, in that those producing learning results require repeated and frequent interaction between teachers and individual students.'

8 Spaull (2012) argues that '[o]ne of the key findings from the international literature on accountability is that capacity precedes accountability' and quotes one Elmore in this regard: 'Accountability systems and incentive structures, no matter how well designed, are only as effective as the capacity of the organisation to respond. The purpose of an accountability system is to focus the resources and capacities of an organisation towards a particular end. Accountability systems can't mobilise resources that schools don't have ... the capacity to improve precedes and shapes schools' responses to the external demands of accountability systems.'

In terms of standards, Heneveld and Craig (1996) stress, in straightforward terms, that for successful reform a 'statement of learning objectives and a definition of characteristics of effective … schools' are critical. The World Bank (2007) points out that a range of standards are necessary: with regard to learning outcomes, for management and funding processes and for teachers, including for recruitment and behaviour. As they further point out, the development of standards must also contribute to create a 'culture of evaluation', which is often absent, partly as a result of fear that evaluation will not result in support but in exposure or removal.

Bruns et al. (2011) argue as follows: 'Our review of the best-evaluated cases to date shows that the design of effective incentives presents challenges and that the impacts vary significantly. An encouraging number of recent studies show positive impacts of incentive reforms on student learning outcomes. The number of developing-country reform experiences is still small, and most are fairly recent. But they permit a preliminary typology of examples that merit consideration by any education policymaker concerned with raising student learning as well as a framework for the generation of further research evidence on "what works" to make schools more accountable for results.'

They focus specifically on three mechanisms of improving accountability and incentives and the evidence about the impact of these measures (they do not discuss a more competitive market through private education such as vouchers and public–private partnerships and administrative decentralisation or giving more autonomy to regions and districts), namely:

- Information;
- School-based management; and
- Incentives for teachers.

With regard to information, the argument is that 'the generation and dissemination of information about schooling rights and responsibilities, inputs, outputs and outcomes will enhance accountability'. It is argued that increased information strengthens the power of households vis-a-vis providers. With information they can hold accountability and lobby. Channels through which information enhance power is through increasing the choice of citizens, increasing participation and also strengthening the 'voice' of parents and other stake-holders (Bruns et al. 2011). Examples of recent education information interventions are provided in Box 5.4. They argue that given the cost-effectiveness of information measures further research is necessary on impact but that experience to date 'suggests that information can lead to improvement in outcomes'.

School-based management (SBM) refers to greater autonomy for decisions being located at school levels. More decisions (in some cases also about personnel appointment) can be made at school level. School-based management normally goes hand in hand with greater community participation as 'the granting of autonomy usually works through the establishment of a school committee'. Bruns et al. (2011) argue that the main thrust behind SBM is that 'it encourages demand, ensures that schools reflect local priorities and values, and allows closer monitoring of the performance of service providers'. On impact they conclude that SBM reforms are 'not a quick fix' (taking as many as eight years to impact on indicators such as test scores) and more cost-effectiveness analysis is required, but that:

- 'Most countries whose students perform well on international student achievement tests give their local authorities and schools substantial autonomy over adapting and implementing education content or allocating and managing resources';
- 'On balance, SBM has been shown to be a useful reform option for a number of reasons. Yet it is better when integrated with other interventions'.

Box 5.4
Examples of information interventions

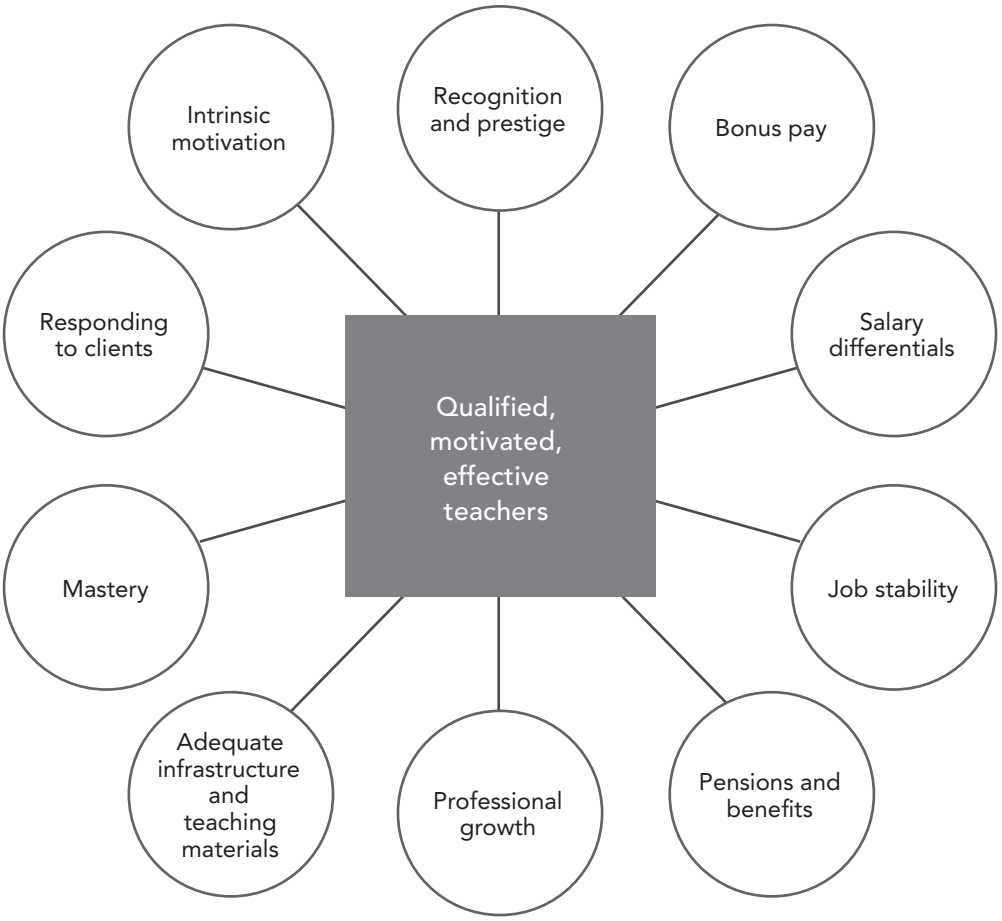
Programme	Nature of intervention	Impact summary	Exposure duration	Evaluation strategy
Chile: school rankings	Publicising top schools in comparison with schools that serve similar populations	No impact on learning outcomes or behaviors	2 and 4 years	RDD
Uganda: newspaper campaign	Publicising through the media the amoiunts and timing of capitation-grant ditribution to districts	Reduced leakage in the flow of resources; increased enrolment and learning	More than 2 years	IV
Pakistan: report cards	Detailed information of externally collected data on perfromance, intensively disseminated to parents, teachers and school administrators	Increased learning outcomes in public schools and initially poor-performing private schools; reduced fees at initially high-performing private schools	1 and 2 years	RCT
India: Jaunpur District, Uttar Pradesh	Promoting awareness about roles, rights, and repsonsibilities of school oversight committees; creating self-assessment tool and village-specific scorecards; contracting remedial teachers for reading instruction	Slightly increased awareness of roles, rights, and responsibilities; no impact on behaviors; no impact on learning outcomes in 'information only' interventions	3–6 months	RCT

Source: Bruns et al. (2011)

Teacher incentives include a whole range of potential factors (see Figure 5.1). Bruns et al. (2011) review contract appointments for teachers (normally more short-term/non-permanent employment at lower cost than normal 'civil service' positions) and financial incentives for teachers. As they point out, incentives can be either individual or group-based and based on inputs or outputs/outcomes. They conclude that the 'most rigorous' impact evaluations found contract teachers to be more cost-effective than regular teachers but that there are questions about cost-effectiveness in cases where teacher supply is more constrained (say for secondary education) and that sustainability may be an issue as contract teaching may just be a route into civil service jobs.

Education institutional change (whether provision of more information or school-based management or teacher incentives) will face opposition from groups who stand to lose (say inefficient teachers) or have the perception that they will lose. Partly to help fight resistance against school autonomy and to ensure availability of key inputs at schools, direct funding to schools (through what is sometimes called 'capitation grants') for certain (normally non-personnel) inputs have become more common. A range of countries in Africa is experimenting with such grants – with Bruns et al. (2011) listing Benin, the Gambia, Ghana, Madagascar, Niger, Rwanda and Senegal and in Mozambique – to schools that participate in the SBM programme.

Figure 5.1 Teacher performance incentives



Source: Bruns et al. (2011)

Bruns et al. (2011) conclude that 'the number of developing-country accountability reform experiences is still small, and most are fairly recent. But they permit a preliminary typology of examples that merit consideration by any education policymaker concerned with raising student learning as well as a framework for the generation of further research evidence on "what works" to make schools more accountable for results.' While Boissiere (2004) agrees with some of the evidence on decentralisation, he also points to areas where centralisation has been found to have positive effects (such as examinations, curriculum and a number of elements of textbook provisioning).

Box 5.5
Capitation grants in Rwanda

'The government implemented courageous reforms to increase enrolment in primary schools', said Christian Shingiro of UNDP in Kigali.

'The education reform abolished school fees in 2003. In 2005, the government in Kigali began transferring resources directly to schools in different districts on the basis of number of students. Rwanda's high level of parental participation in Parent-Teacher Associations enabled households to have a voice in how school capitation grants (a form of conditional cash transfer) were utilised. Classroom construction was scaled up, and double-shift classes were mandated in order to ease overcrowding.'

'This helped primary school enrolment to grow at an average annual rate of 6% since 2000. National statistics show that the rate is currently at 92%, with higher enrolment rates for girls (they also perform better than boys). The expansion has resulted in greater access to primary education for the poor.'

Source: http://content.undp.org/go/newsroom/2010/may/100507-rwanda-education.en

5.3 Other levers for system reform

The previous sub-section focused on accountability reforms in the school environment. Parallel to education reforms countries have, however, been focusing on broader public sector governance reforms and public finance management reforms. A number of aspects of inefficiency in school systems such as leakage of funds through fraud and theft, lack of proper procurement, resources arriving late and wastage because of supplies stuck in warehouses. While education economists have tried to more rigorously assess the impact of education reforms, there are very few assessments of public sector reform and its impact in the education sector specifically.

In this regard Latham et al. (2006) have remarked that: 'Many African countries have adopted MTEFs for public finances in all sectors of the economy. However, the majority of the effort and training has been on budget planning and preparation, with little focus on budget execution and even less focus on monitoring and evaluation of education expenditure. This means that it is difficult to know whether education spending is efficient and effective.'

Given the importance of these public financial management aspects, Gonand et al. (2007) have proposed a set of 'institutional indicators' which monitor aspects associated with public spending efficiency in education. They propose indicators related to:

- Efficiency in resource allocation, namely the extent of decentralisation and whether there are mechanisms for funding specific needs (say for learners with special education needs);
- Efficiency in budget management, namely whether there is an outcomes focus and whether there is managerial autonomy at the school level;
- Market efficiency, namely whether activities are benchmarked against best practice and whether choice/competition is allowed.

Table 5.1, extracted from Lewis and Patterson (2009) gives an overview of some governance challenges in education and indicators or indicator sets that could be used to track performance. Incorporating these governance challenges more explicitly into sectoral reform programmes and tracking progress could be useful additions to the other elements of reform, namely a focus on cost-effective inputs and improving institutions for accountability. In fact there are some overlaps.

Table 5.1 Overview of governance challenges in education and indicators and indicator sets

Area	Issue	Key indicator(s)
Budget and resource management	Budget processes	PEFA Indicators track budget credibility, comprehensiveness, transparency, execution, recording, reporting, and external audits and scrutiny.
	Budget leakages	Discrepancy between budgeted public education funds and the amounts received by education providers.
	Payroll irregularities	Discrepancy between payroll roster and education workers in site.
Human resources	Job purchasing	Frequency of illegal side-payments/bribes influencing hiring decisions and of payments for particular assignments.
	Teacher absenteeism	Fraction of teachers contracted for service but not on site during the period(s) of observation.
Household payments	Informal payments	Frequency of illegal charges for publicly provided education services.
	Academic fraud	Fraction of respondents perceiving academic fraud involving payments.
	Involuntary private tutoring	Frequency of teachers charging for private tutoring of academic material omitted from the required curriculum.
Corruption perceptions	Perceptions of corruption	Fraction of households, public officials or experts reporting corruption in the education sector. Relative ranking of education sector on corruption indices.
	Institutional quality	The Country and Policy Institutional Assessments (CPIA) for education.

Source: Lewis and Patterson (2009)

5.4 Building country research capacity

Evidence on what works in education and about how to improve efficiency has been steadily accumulating. The focus has also moved beyond which inputs are cost-effective to a greater focus on institutional reforms that could boost accountability, incentives and performance. In a great majority of areas related to the accountability system and also with regard to what happens in classrooms, data and evidence remain limited. In many other areas evidence is mixed.

One reason why evidence could be mixed is that what works depends very much on context and location and also that policies are very specific and what may be compared between studies could be the results of slightly different policies.

The uncertainty about the impact of many policies in education and the importance of specific context and policy formulation, contrasted with the critical importance of improving education in the developing world, has led to proposals around research and research capacity in developing countries.

Glewwe (2002) proposes that 'each country must rigorously test different policies, and indeed different versions of the same policy [and combinations of policies] to see which version, if any, works well for that country'. And Boissiere (2004) echoes that 'Countries need to build their local research capacity as they experiment and innovate'. Majgaard and Mingat (2012) state, in the context of performance incentives that 'although evidence on the effectiveness of specific interventions is still scarce, this should not deter policymakers from experimenting with different policy instruments and thus adding to the pool of knowledge about the most cost-effective ways to improve student learning'.

In their 2009 study McKinsey also identified the key role of educational research among some of the top performing countries in education. Box 5.6 provides some of the examples such as Singapore's National Institute for Education and Hong Kong's 'Quality Education Fund'. Recent recommendations for KwaZulu-Natal Province in South Africa included the establishment of a research community engaged in researching education in the province and suggesting a partnership between universities, a strengthened research coordination function in the education department and research institutes and non-governmental organisations (School of Education and Development 2010).

The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) is an example of a cooperative research endeavour that has led to a substantial increase in data about learner performance and, together with socio-economic and other data collected, allows for the in-depth research of student performance and the factors it relates to. Its specific objectives are 'to work together to share experiences and expertise in developing the capacities of education planners to apply scientific methods to monitor and evaluate the conditions of schooling and the quality of education'.[9] The International Institute for Educational Planning (IIEP) is currently busy with a project to assess the impact of SACMEQ.

In addition to cooperative research to gather and analyse comparable assessment and related data, the suggestions above are for more experimentation and assessment of such experiments. It is here, as Glewwe (2002) argued, where 'the real promise of randomised trials' lies.

9 SACMEQ is an 'international non-profit developmental organisation of 15 Ministries of Education in Southern and Eastern Africa that receives technical assistance from UNESCO's International Institute for Educational Planning (IIEP). The 15 Ministries of Education that constitute the SACMEQ network are Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania (Mainland), Tanzania (Zanzibar), Uganda, Zambia and Zimbabwe. SACMEQ has completed two major education policy research projects (SACMEQ I and SACMEQ II) between 1995 and 2005. The third (SACMEQ III) project commenced in 2007 was completed in 2011.

Box 5.6
Education research in some of the world's top performers

'[T]he best systems use the results of monitoring and intervention to identify best practices, which can then be spread throughout the system.'

- *Singapore* studies the practices in the best schools, and has ensured that the lessons from this are transferred to other schools. Singaporean researchers have built classroom-laboratories at the National Institute for Education where they carefully monitor student reactions to new instructional ideas, techniques and strategies being tested there. They then apply their findings to future education reform.
- *England* uses data from its inspections and assessments to identify the best schools and teachers, and then uses this to develop new approaches and further reform.
- *Hong Kong* created 'The Quality Education Fund' to support schools that undertake approved school improvement projects or action research.
- *South Korea* funds action research by teachers and counts these efforts toward their professional development requirements.

Source: McKinsey 2007 & 2009

6. Conclusion: Education/finance dialogue and improving efficiency

This paper has pointed to numerous areas of inefficiency in education spending. As one moves beyond focusing on specific inputs to outcomes and comparing outcomes and costs, it is clear that inefficiencies in education systems are not merely anecdotal but pervasive. International research has shown that wastage is not only a characteristic of education in Africa but can be found across the world. However, the implications are harshest in sub-Saharan Africa because of the very low levels of educational attainment and outcomes and because of the huge unmet need for education and constrained budgets.

Specific aspects of inefficiency were identified by looking at internal, allocative and technical inefficiency and the methods to analyse these.

The final sections of the paper argued that moving to improve efficiency should entail the further enhancement of country research capacity to assess the value or impact of untested interventions, a focus on further reforming institutions for accountability (both education institutions and the broader government governance machinery) and ensuring that there is a balanced and equitable allocation of spending with a strong focus on cost-efficiency.

Reform will be enhanced if education and finance departments can develop a shared understanding of the problems and the reform strategy and can support each other in further developing and using the evidence for decision-making. There is a particular challenge to ensure that sector reforms and broader public financial management reforms (for example, in areas such as planning, procurement and decentralisation or school autonomy) can support each other.

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