



**Monitoring and Data Use in Developing Countries: Findings
from a Systematic Literature Review**

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Monitoring and Data Use in Developing Countries:

Findings from a Systematic Literature Review

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Abstract

Purpose: The collection and dissemination of standardized performance information about students, teachers, schools and school systems offer potentially important tools for school accountability and resource allocation as well as school improvement in developing countries. However, performance monitoring systems in developing countries are in many cases copied from those in high-income countries without a clear understanding of their functioning in contexts of limited resources and capacity for change. Our review examines the conditions under which and the mechanisms through which system-wide performance monitoring affects school-level organization and processes in Low- and Middle-Income Countries (LMICs).

Methodology: The review employs realist synthesis because of the complexity and dynamism of conditions in LMICs, the wide variability in available literature, and our aim of explaining how particular organizational outcomes arise, given particular conditions. We draw on findings from a systematic review of 22 studies and reports, published since 2001, related to the implementation of performance monitoring.

Findings: Our findings highlight key barriers to the use of data to inform school accountability and improvement. Capacity to collect, interpret and use data is an important condition to both effective external accountability as well as improvement of schools.

Originality: The review uses realist approaches to building middle-level theories to help scholars, educational advisers, policy makers and educational leaders understand the causal processes that

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3 result in certain outcomes from monitoring activities and to identify the conditions that are
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5 necessary for those processes to have the desired outcomes.
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8 **Keywords:** monitoring practices; school performance; school organization; developing
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10 countries; accountability; realist synthesis
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Introduction

Over the past 15 years, the definition of educational equity in developing countries has transformed from an overarching concern with access to an emphasis on quality (World Bank, 2011). The system-wide monitoring of performance information is among a palette of educational reforms implemented by high-income countries (HICs) that have been widely adopted by low- and middle-income countries (LMICs) as a means of improving quality of service delivery and redressing persistent inequalities in educational outcomes (Wagner et al., 2012; Kellaghan & Greaney, 2001). The collection and dissemination of standardized performance information about students, teachers, schools and school systems are employed as important tools not only for monitoring the state of education but also for promoting educational development by encouraging reform of local school policies, improving organizational processes in schools, and shifting teaching practices in an effort to improve schools in the most challenging circumstances and reach the poorest and most marginalized children.

This paper presents the findings of a systematic literature review of the conditions and mechanisms through which performance monitoring in low- and middle-income countries improves school-level outcomes. For the purpose of this review, we define *monitoring* as, “the ongoing, systematic collection of information to assess progress towards the achievement of objectives, outcomes and impacts” (OECD-DAC, 2002, p. 27). This includes activities designed to collect, compare and report school-level information about the composition, organisation and functioning of schools. Monitoring may be used in the literature to refer to all types of accountability activity that have as their purpose the evaluation of the system of schooling, including inspection and assessment, as well as collecting, disseminating and using performance

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3 information. It is this latter set of activities around performance information and the
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5 infrastructure and methods used to track school-level information collected through
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7 quantitative/empirical methods in which we are interested. Monitoring refers specifically to the
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9 activities designed to collect, compare and report school-level information about the
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11 composition, organisation and function of schools. This necessarily encompasses the ways that
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13 results of standardized assessments may be used, but we also look at the collection and use of
14
15 the wider set of school-level performance information that might be collected and used in a
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17 system of monitoring. In addition to the presentation of test scores, reported information may
18
19 include students' socioeconomic characteristics; other performance measures; results from
20
21 surveys of student and parent satisfaction with various school features; school financing and/or
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23 audit findings; school-level inputs and expenditures (Bruns, Filmore, & Patrinos, 2011). An
24
25 example from an initiative to publicly monitor individual schools through the publication of a
26
27 'school report card' used in the Brazilian state of Parana provides an illustration of the range of
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29 information that this might include (See Box 1).
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BOX 1: State of Parana, Brazil, School Report Card

The report card followed a standard format for the report on each school. In addition to aggregate results of students' test-based performance, information included student flows (promotion, retention and drop-out rates), school characteristics (average class size and teachers' qualifications), results from parental surveys (satisfaction about facilities, security, teaching practices, quality of education, and parental involvement), and parent opinions on the availability of information about school performance and activities. Most of the items also included comparative municipal and state averages to help those using the report to understand how a particular school was positioned in terms of neighbouring schools. (Bruns et al, 2011, p. 60). (See also Crouch and Winkler, 2008, p. 26, Text Box 3.)

Empirical research, project reports, and conceptual discussions of performance monitoring in both HICs and LMICs highlight the potential of performance information to act as a lever for improving educational practice at the school level (e.g., Bruns et al., 2011; Datnow & Hubbard, 2016; Eddy-Spicer, 2017; Gelderblom, Schildkamp, Pieters, & Ehren, 2016; Hoogland et al., 2016; Spillane, 2012). Promising attributes of the implementation of monitoring noted in a recent synthesis of global monitoring practices in education (UNESCO, 2016) include evidence-based decisionmaking; transparency; and greater system coherence through the alignment of performance standards, school-level processes, and individual professional practice. The prospect of coherence inspires proponents to argue that well-designed information systems can serve both as dipstick to monitor the system and also as rudder, a means of steering individual

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3 schools and the school system overall towards higher quality provision, especially for students
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5 from marginalized communities (Rosenkvist, 2010; Wagner et al., 2012).
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9 Critics, however, raise questions about unintended consequences for educational
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11 provision when quantifiable aspects of the educational system, such as results from standardized
12
13 testing, take precedence over broader definitions of educational quality (Courtney, 2008;
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15 Mukhopadhyay & Sriprakash, 2013; Unterhalter, 2016). Critique of the implementation of
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17 performance measurement as a means of improving quality of schooling highlights the complex
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19 interactions among school-level processes and policy-level intentions (Barrett, 2011; Somerset,
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21 2011; Tikly, 2011). These arguments advance the view that defining quality in terms of
22
23 quantitative social indicators ignores the kinds of distortions presaged by what has come to be
24
25 known as ‘Campbell’s Law’: “The more any quantitative social indicator is used for social
26
27 decision-making, the more subject it will be to corruption pressures and the more apt it will be to
28
29 distort and corrupt the social processes it is intended to monitor” (Campbell, 1979, as quoted in
30
31 Ehren, 2019, p. 393). This draws our attention to the unintended consequences that an emphasis
32
33 on performance monitoring entails, as well as highlighting the interplay among school-level
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35 processes and context that are crucial to sustainable quality improvement. This emphasis on
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37 process in relation to quality draws attention to what has been called the ‘black box of schooling’
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39 (Schiller, 2014, p. 403), the teaching and leading practices within and around classrooms that are
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41 the near-term indicators of educational quality.
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49 The systematic review reported in this article acknowledges both the limitations and
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51 necessity of performance monitoring activities to shape the quality of schooling. Our aim is not
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53 to discern how quality is defined in the long-term, a vitally important debate. Our intention is to
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55 illuminate the ways through which performance monitoring aims to influence, and actually does
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influence, the work of leading and teaching at the school level.

Methodology

The question guiding our review of monitoring studies (LMICs)¹ is the following:

Under what conditions does monitoring improve school-level outcomes in low- and middle-income countries?

Outcomes at the school level comprise the two overlapping areas of service delivery and student learning outcomes. Service delivery encompasses school-level processes of organizing work, which includes the ‘technical core’ of schooling, the primary processes that provide the conditions for learning in the classroom, as well as the wider organizational structure and processes that provide the direct and indirect conditions for classroom practice. Examples of improved organizing processes at the school level might include processes that lead to reduced teacher absenteeism or increase the time children are in school being taught (Bold et al., 2011).

School-level organizing processes, in turn, affect student learning outcomes, the other element of school-level outcomes that we consider. Learning outcomes have a wide range of definitions, from concern with ‘quantity’, as expressed in years of schooling and used in studies on returns to education (e.g., Mincer, 1974) to the broad and aspirational qualities portrayed in the Universal Declaration of Human Rights (United Nations General Assembly, 1948). We emphasize performance on standardised assessment as a proxy for learning outcomes. We realize

¹ The review reported in this article is part of a broader systematic review of the implementation of three facets of school accountability policies: inspection, performance monitoring and standardized assessment in Latin America, sub-Saharan Africa, South Asia and East Asia (Eddy-Spicer, Ehren, Bangpan, Khatwa, & Perrone, 2016; Ehren, Eddy-Spicer, Bangpan, & Reid, 2016; Eddy-Spicer, Ehren, Bangpan, & Khatwa, 2014).

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3 that clarifying what one means by student learning outcomes depends on the purpose coupled
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5 with identification of appropriate proxies. Current approaches to school accountability
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7 overwhelmingly focus on the acquisition of cognitive skills as expressed through student
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9 performance on standardised assessments (Vegas and Petrow, 2008).
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13 The review question emphasizes the *conditions* under which monitoring results in
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15 improvement in school-level processes and learning outcomes. This highlights the importance of
16
17 certain features of the organizational environment that directly and indirectly influence school-
18
19 level outcomes. As we describe below, our conceptualization of the school environment follows
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21 an open- or natural-systems perspective of the school and school system as a set of complex,
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23 interdependent parts, which are reciprocally dependent on a larger environment (Thompson,
24
25 1967). Such a perspective might embrace any number of contextual conditions, from national
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27 government policy mandates to the demographics of the local community (Brazer, Bauer, &
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29 Johnson, 2019).
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Realist Synthesis

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37 The focus on conditions under which change occurs (or not) in school-level outcomes in
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39 relation to monitoring activity has led us to an approach to systematic review known as realist
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41 synthesis. Realist synthesis has emerged relatively recently as a tool for systematically exploring
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43 literature that is widely varied in quality and approach. Realist synthesis offers particular insight
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45 for topics, such as accountability in education, that involve complex system dynamics (Wong,
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47 Greenhalgh, Westhorp, Buckingham & Pawson, 2013; Pawson, 2006; Pawson, Greenhalgh,
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49 Harvey & Walshe, 2005). Realist synthesis lends itself to the complex task of tracking contextual
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51 conditions by offering a methodology for tracing connections among particular contextual
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53 *conditions* and *outcomes* of interest. In realist terms, the links between conditions and outcomes
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3 are known as *mechanisms*. These are the social processes that offer ways of explaining, “What
4 works, for whom, and under what conditions?” (Wong et al., 2013). Realist review entails
5 viewing programs, such as initiatives that involve performance monitoring, as indeterminate.
6 That is, a performance monitoring initiative does not have causal powers in and of itself; rather
7 the implementation of monitoring offers an array of resources that may or may not be taken up or
8 may be taken up but not as originally intended. Conditions, then, are the ways that particular
9 social programs, such as Educational Management Information Systems (EMIS), come to be
10 recognized as resources and get taken up to produce certain outcomes. The process of taking up
11 those resources constitute mechanisms, the social processes that link conditions with outcomes
12 (Greenhalgh, 2014). In brief, realist synthesis provides a methodology for identifying and
13 analyzing conditions, mechanisms, outcomes, and the relations among these entities.
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29 Our review protocol (Eddy-Spicer et al., 2014) is formally registered with the EPPI-
30 Centre, UCL Institute of Education, University of London, which also served as technical
31 advisor to our review process. This review follows the publication standards for realist reviews
32 put forward by the RAMESES (Realist And Meta-narrative Evidence Syntheses: Evolving
33 Standards) project (Wong et al., 2013). Below we detail the key steps in the review process,
34 including elaboration of our initial rough theory and the several phases of our systematic
35 screening, identification, description, and synthesis of studies.²
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46 Initial Rough Theory

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48 Realist synthesis begins with the elaboration of an initial theoretical framework. The
49 ‘initial rough theory’ intends to identify possible mechanisms connecting conditions and
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55 ² Our realist synthesis approaches are described in detail in the technical report available online (Eddy-Spicer et al.,
56 2016); Appendix 2.1 of that report (pp. 240-241) details our adherence to RAMESES publication standards.
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3 outcomes related to monitoring. To develop our initial theory, we drew on and extended
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5 Bouckaert and Halligan (2008); Scheerens (1992); Ehren, Altrichter, McNamara, and O'Hara
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7 (2013); and Hatch (2013) to identify the five categories of mechanisms that we initially
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9 proposed as most likely to contribute to school-level outcomes attributable to performance
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11 monitoring activities (see Fig.1).
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14
15 Broadly, monitoring is a form of performance-based contracting (Bouckaert and
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17 Halligan, 2008). Generic phases of monitoring activities can be described as:
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21 • benchmarking - the delineation of standards, performance information, performance
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23 measurement.
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- 25 • incorporation – integrating definitions into documents, procedures, discourses
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- 28 • use – in what ways, if any, the output from the process of incorporation is used within
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30 the system. This may include the consequences of outputs of the process for the
31
32 organisation and individuals.
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36 We then elaborated a generic hypothesis about how monitoring intends to influence
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38 school-level outcomes based on the integrated open systems model of school effectiveness put
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40 forward by Scheerens (1992). At its most basic, according to Scheerens, schooling at the
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42 organisational level consists of four aspects:
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46 • inputs of technical, human and social capital
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- 48 • processes of the technical and administrative core, with 'technical' indicating classroom-
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50 level interactions amongst teacher-students-curriculum and 'administrative', indicating
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52 the organising processes of the school
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- 55 • outputs that relate to student learning
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- outputs that relate to the technical efficiency of the school.

Outputs from monitoring activities aim to influence two levels of outcomes – those at the organisational level and those at the level of the educational system. Our concern in this review lies with the organisational level. At the school level, desired outputs from monitoring activities include increased student access to education, reflected in increases in enrolment as well as more regular student attendance; we also expect to see more time devoted to teaching in classrooms and greater allocation of education expenditure for teaching and learning as an outcome. Finally, these outputs at the school level can be translated across schools in ways that lead towards system outcomes, of technical efficiency as well as societal efficiency (Cheng, 2005) – the contributions of the school and school system to an educated, equitable society.

Our elaboration of this open-systems model draws on and extends Ehren, Altrichter, McNamara, and O’Hara (2013) and Hatch (2013) to highlight five hypothetical mechanisms that explain how performance monitoring activities lead to school-level outcomes:

- setting expectations,
- providing feedback/consequences,
- capacity development of educators,
- capacity development of local stakeholders, and
- institutionalisation of norms.

Each of these mechanisms operates at multiple levels within the overall system and in the relationship of the system to external stakeholders (e.g., community members, politicians, policy makers). A realist review intends to identify mechanisms of programme action such as these and then describe the conditions under which they do or do not yield desired outcomes.

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Our interest in this review is in examining specific mechanisms aligned with the generic pathways that we have identified in our initial rough theory and that produce school-level outcomes. Table 1 illustrates configurations of conditions, mechanisms, and outcomes we might expect to find if conditions triggered the kinds of mechanisms identified in our initial rough theory in order to produce desired outcomes that might be attributable to performance monitoring activities. These configurations are speculative but serve to illustrate idealized programme pathways through which performance monitoring activities might operate. Following the table we describe these theorized programme pathways in greater detail. It is important to note that these programme pathways and our initial rough theory are based on effective schools research (Scheerens, 1992) and theoretical literature (Ehren, Altrichter, McNamara, and O'Hara, 2013; Hatch, 2013) rooted in the experiences and environments of high-income countries.

Table 1: Speculative Conditions-Mechanism-Outcome Configurations (C-M-O) related to performance monitoring activities.

Conditions	Mechanism	Outcome
<ul style="list-style-type: none"> Effective monitoring systems Belief that the authority holder will act on data received through monitoring system Incentives of sufficient power Performance can be observed 	Setting expectations (Ehren et al., 2014)	Improvements in the extent to which, or standards at which, responsible parties implement the actions required of them.
<ul style="list-style-type: none"> Authority holder acts on performance information received through monitoring system Effective uses of performance information for performance improvement Incentives of sufficient power Performance can be observed 	Providing feedback/ consequences (Ehren et al., 2014)	Improvements in the extent to which, or standards at which, responsible parties implement the actions required of them.
<ul style="list-style-type: none"> Investment in developing high-quality teaching practice 	Capacity development of educators	Sustained improvement in service delivery

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<ul style="list-style-type: none"> • Sustained and highly-respected opportunities to put skills into practice • Support for continued development of skills 	(Hatch, 2013)	Sustained improvement in student learning outcomes
<ul style="list-style-type: none"> • School leadership and staff capacities and attitudes support stakeholder engagement • Information, training and support provided to stakeholders 	Capacity development of stakeholders (Hatch, 2013)	Stakeholders have the skills to undertake roles expected of them Quality of stakeholder oversight of schooling Resources available for education improved
<ul style="list-style-type: none"> • Educators recognize value and see benefit of existing expectations • Concrete performance expectations integrated into processes of school organizing • Sustained support for development of skills and knowledge 	Institutionalisation of norms (Bouckaert and Halligan, 2008)	Organisational and individual internalisation of system expectations Internal accountability with focus on meeting service delivery and learning outcomes expectations, not consequences

Source: Adapted from Westhorp et al. (2014, pp. 59-60)

Programme Pathways of Performance Monitoring Activities

The first programme pathway is **setting expectations**. This acknowledges the fact that performance indicators in monitoring systems, have a normative or standardisation purpose. Such indicators not only serve a measurement function to undertake monitoring of school quality, but they also communicate expectations about goals and about what a good school, a good lesson and good performance constitute. Schools are expected to use the criteria and descriptors set out in the frameworks (e.g., education management information systems or school report cards) to define their own standards of a 'good school' and a 'good lesson' and to incorporate these standards into their daily work and teaching. The communication and use of standards in school monitoring are expected to motivate schools to reflect on the standards,

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3 process them and adapt their goals and their practical ways of working in such a way that they
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5 come closer to the normative image of schools communicated by the accountability indicators.
6
7 This behaviour in response to expectations corresponds with *answerability*, the notion that
8
9 schools should be accountable for meeting agreed-upon procedures and goals (Gregory, 2003).
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13 The second programme pathway is through the **feedback** from monitoring that is
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15 provided to schools. Such feedback may include an outline of strengths and weaknesses on
16
17 school quality in benchmark information around a number of performance indicators in school
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19 report cards or education management information systems. Monitoring systems often set targets
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21 for school performance and have consequences (e.g. sanctions and/or rewards) in place for low-
22
23 and high-performing schools. Such consequences are expected to motivate schools to attend to
24
25 the feedback provided. Schools are assumed to use the feedback to improve, and stakeholders are
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27 expected to take note of the feedback and hold schools accountable for their use of the feedback
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29 for improvement.
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35 **Capacity development of educators** is our third programme pathway and refers to the
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37 school's capacity to enhance the professional learning of teachers and to transform large-scale
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39 reform into accountable student-oriented teaching practices. Improvement capacity is considered
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41 to be an important condition for school development in general, as well as in response to external
42
43 monitoring. School monitoring is expected to build a school's capacity for improvement
44
45 primarily through: impact on school self-evaluation and the school's internal quality assurance
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47 systems; impact on professional development, school collaboration and external support around
48
49 (improvement on) monitoring indicators; and introducing new leadership roles. High-quality
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51 self-evaluation is considered to be a critical element in improvement of schools, as schools
52
53 identify and correct problems in the quality of their school in preparation for, and in response to
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external monitoring. Internal quality assurance mechanisms, together with external monitoring, are seen as inseparable and integral parts of an informed and evidence-based improvement cycle that build capacity in schools to improve the teaching and learning and lead to improved student outcomes.

Capacity development of local stakeholders, as a fourth programme pathway, is about engaging a ‘third’ party in school monitoring, providing them with the information and support to have an active role in school evaluation and improvement. Local stakeholders typically include parents and community members, as well as students and local officials. Examples of capacity development might include the public dissemination of results such as school monitoring report cards, as well as forms of participatory evaluations in which a school’s stakeholders take an active role in the evaluation of schools, such as when the school is required to actively engage with community members in the process of constructing and analysing school monitoring report cards.

The inclusion of stakeholders as a ‘third’ party in school monitoring is expected to reinforce public recognition of monitoring standards and make it more likely that schools react to these standards in anticipation of the response of local stakeholders. Stakeholders may, however, become more active and raise their ‘voice’ in order to motivate schools to improve. If schools do not give stakeholders sufficient opportunities for participation (in that they accept some ‘stakeholders’ influence’ or enter into ‘negotiation’ with them), stakeholders may retreat to the option of ‘choice’ or ‘exit’ where parents choose to enter or move their child to a higher-performing school. ‘Choice’ and ‘exit’ are expected to exert pressure on schools to conform to monitoring standards through the introduction of competition between different providers, while

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3 ‘voice’ alternatives allow parents to express preferences and opinions around education service
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5 delivery that would motivate schools to improve.
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9 The final programme pathway is the **institutionalisation of norms**. When the behaviours
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11 of teachers and school leaders, as well as local stakeholders, move beyond compliance with
12
13 expectations set externally, then this is an indication that the values, attitudes and beliefs implicit
14
15 in systems of monitoring are internalised in educators’ and stakeholders’ ongoing practices. This
16
17 corresponds with Bouckaert and Halligan’s (2008) notion of *internal consolidation* in response
18
19 to performance management (p. 125). For example, when school leaders and teachers view
20
21 school development planning as an integral aspect of ongoing school management practices
22
23 rather than a bureaucratic procedure in response to external demand, the norms around integrated
24
25 management and data use have become institutionalised in the sense that they are woven into the
26
27 organisational fabric. Similarly, parents and local community members may openly question
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29 school leaders about their school’s performance in comparison with neighbouring schools, which
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31 is again an indication that norms of local responsibility for schools have taken root.
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37 Each of these programme pathways operates at multiple levels within the overall system
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39 and in the relationship of the system to external stakeholders (e.g., community members,
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41 politicians, policy makers). In this review, our focus was on the organisational implications of
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43 systemic elements. A realist synthesis intends to identify actual mechanisms of programme
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45 action which may or may not resemble the programme pathways we have hypothesised here.
46
47 Actual mechanisms are inferred from identification of the particular conditions under which
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49 programme activities yield specific outcomes. Our interest in this review was in examining those
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51 mechanisms that produce school-level outcomes with reference to our hypothesised mechanisms
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53 or programme pathways. Our initial rough theory is summarized in Figure 1.
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[Figure 1: Initial rough theory INSERT ABOUT HERE]

Identifying and Describing Studies

Identifying and describing studies in this realist synthesis was done over six overlapping phases: (1) scoping of the literature and theory elaboration, (2) search process, (3) screening and selection of relevant papers, (4) characterizing included studies in a systematic map, (5) quality appraisal and data extraction, and (6) analysis and synthesis.

We used the general categories of mechanisms defined in our initial rough theory (phase 1) to identify, analyse and synthesize the literature and elaborate connections between particular conditions and outcomes (phases 2-6). In phase 2, we systematically identified sources from nine bibliographic databases;³ references in existing systematic reviews and papers relevant to the review question and websites. Key authors and advisory group members were consulted for additional (unpublished) sources of information and relevant literature, and we continued to find additional papers relevant to the initial rough theory in phase 3 by checking references and citations from included sources. In phases 3 and 4, we screened and characterized included studies in a systematic map. Inclusion criteria were studies in primary and secondary education, conducted in East Asia and Pacific, South Asia, Sub-Saharan Africa, and Latin America and published in English on/after 2001 (see Figure 2).

[Figure 2: Flow of literature identified and included in the synthesis INSERT ABOUT HERE]

³ Bibliographic databases included: Australian Education Index (AEI), British Education Index (BEI), Econlit, Education Resources Information Centre (ERIC), International Bibliography of the Social Sciences (IBSS), PsycINFO, Social Sciences Citations Index (SSCI), Social Service Abstracts (SSA), Sociological Abstracts. Full details of sources and key websites searched are available in Appendix 2.3 of the technical report (Eddy-Spicer et al., 2016, pp. 173-174).

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3 In phases 5 and 6, we assessed the quality of included studies and coded the studies in
4 specialized systematic review software, EPPI-Reviewer 4.0 (Thomas, Brunton, & Grazios;
5 2010). The fifth phase entailed quality appraisal along with extracting data from the selected
6 papers. Pawson (2006) and Wong et al. (2013) argue for two dimensions of quality in realist
7 synthesis: relevance and rigour. Relevance aims to appraise whether and to what degree
8 contributions from a particular paper support, weaken, modify, supplement, reinterpret or
9 refocus the initial rough theory (Greenhalgh, 2014, p. 270). Rigour in realist terms refers to
10 whether, “a particular inference drawn by the original researcher has sufficient weight to make a
11 methodologically credible contribution to the test of a particular intervention theory” (Pawson,
12 2006, p.22).
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27 We developed two categories to assess the relevance of papers included in the in-depth
28 review. We assessed whether a paper aimed or partly aimed to investigate, explore or describe
29 accountability in general or monitoring in particular – ‘Relevance Focus’. The second aspect,
30 ‘Relevance: Theoretical contribution’, was a holistic appraisal of the potential contribution of
31 the evidence to the elaboration and testing of our initial rough theory and offered sufficient
32 explanation why an intervention led to a particular outcome, in particular, specifying the
33 particular conditions that triggered causal processes that led to the intended outcomes. We
34 included only papers judged to be ‘highly relevant’ and ‘somewhat relevant’ for both ‘Focus’
35 and ‘Theoretical contribution’ in the synthesis.
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49 We adapted existing quality assessment criteria for assessing the methodological rigour
50 of the whole study, including the Mixed Methods Appraisal Tool (MMAT) (Pluye et al., 2009)
51 and DfID (2013). Studies were assessed according to their methodological quality using the
52 following broad criteria:
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- theoretical understanding (quality of the reporting of a study's theoretical and conceptual framework, aims and rationale of the research, theory of change).
- sampling method (steps taken to minimise selection bias and confounding).
- the sufficiency of the strategies reported for establishing the reliability and validity of data collection methods.
- the sufficiency of the strategies reported for establishing the reliability and validity of data analysis methods.

An overall judgement of rigour (high, medium, low) was assigned for each study in terms of the plausibility and coherence of the method/rationale used to generate data and explanation. For a non-empirical paper (e.g., papers that drew inferential claims based on reviews of literature or arrived at logical conclusions based on philosophical arguments), we assessed rigour in relation to discrete aspects of the paper according to the strength of the inferential conclusions in terms of the transparency of the premises and the quality of the underlying evidence.

We rated both the relevance and rigour of the studies as high, medium and low, using an appraisal tool that we developed for the study. Each reviewer reviewed the data extracted on the descriptive information of policy and intervention programmes, the theoretical and research backgrounds, study aim, study design, data collection, and data analysis. An overall judgement of rigour was assigned for each study in terms of the plausibility and coherence of the method/rationale used to generate data and explanation. For a non-empirical paper (e.g., papers that drew inferential claims based on reviews of literature or arrived at logical conclusions based on philosophical arguments), we assessed rigour in relation to discrete aspects of the paper

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3 according to the strength of the inferential conclusions in terms of the transparency of the
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5 premises and the quality of the underlying evidence.
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9 From each paper, we extracted information to describe the key features of each study
10 and the monitoring activities reported in the study, including details on conditions, outcomes
11 and suggested or inferred mechanisms. The iterative process of extracting and coding data on
12 programme characteristics and implementation led to the identification of '*pathways to impact*'
13 in our synthesis of performance monitoring literature. Pathways to impact were defined as the
14 ways that programmes were designed to produce intended outcome. Clarifying intended
15 pathways to impact allowed us to understand how reported or suggested mechanisms of impact
16 described in the literature differed or aligned with what the program intended to accomplish.
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28 Our synthesis of outcomes proceeded by organizing the findings around common
29 themes. We then characterized conditions that facilitated or impeded outcomes under each
30 pathway. The concluding round of analysis consisted of using constant comparative approaches
31 to analyse the connections of outcomes to conditions to make inferences about potential
32 mechanisms. In the synthesis phase we elaborated and tested the findings through additional
33 mining of existing papers. The findings about conditions and outcomes were then used to
34 elaborate a more refined model of potential mechanisms.
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45 Findings

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48 A total of 17,259 citations were identified from database- and hand-searching for the
49 review overall. Inclusion and exclusion criteria were applied successively to identify 214
50 studies for in-depth review. A total of 22 papers judged to be 'highly' or 'somewhat' relevant in
51 relation to performance monitoring were included in the synthesis, and data were extracted for
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the intervention characteristics, study design, contexts, mechanisms and outcomes, and assessed for study rigour. Please see Figure 2 for a flow diagram of the process of selection.

Of the 22 performance monitoring papers we identified for in-depth review, ten studies were conducted in Sub-Saharan Africa. An additional five papers covered multiple regions, and seven were country case studies in Latin America (n=2); East Asia (n=4) and South Asia (n=1). The majority of the 22 monitoring papers are case studies, research reports and literature reviews. Five quantitative studies reported the impact of monitoring related activities on school-level and learning outcomes. Three papers were judged as high on rigour, 11 as medium and 8 as low. Eighteen papers discussed various aspects of Educational Management and Information System (EMIS) including planning and implementation. Five papers focused on school report cards. (One paper, Bruns (2011), addressed both areas.) Six of the papers in our review, spanned all regions (ADEA, 2001; Barr et al, 2012; Brock, 2009; Bruns et al, 2011; Crouch and Winkler, 2008; De Grauwe, 2007) and specifically identify a shift towards an increased role for local actors in system-wide monitoring--including teachers, school leaders, parents and community-members. Table 2 summarizes the included papers.

Table 2: Reviewers' judgements about rigour and relevance of each study included in the monitoring synthesis

Studies (first author and date)	Rigour			Relevance	
	High	Medium	Low	High	Medium
ADEA (2001)			✓		✓
Andrabi (2013)	✓				✓
Attfield (2013)		✓		✓	
Barr (2012)	✓			✓	
Brock (2009)		✓			✓

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Bruns (2011)		✓		✓	
Caddell (2005)		✓			✓
Chen (2011)		✓			✓
Crouch (2008)			✓	✓	
De Grauwe (2007)			✓		✓
Gvirtz (2004)		✓			✓
Higgins (2005)		✓			✓
Lassibille (2010)	✓			✓	
Murimba (2005)			✓		✓
Powell (2006)		✓			✓
Prew (2010)			✓		✓
USAID (2006)		✓		✓	
USAID (2007)		✓		✓	
Winkler (2005)			✓		✓
Winkler and Herstein (2005)			✓		✓
World Bank (2008)		✓			✓
World Bank (2010)			✓		✓

We found evidence of school-level outcomes and traced corresponding conditions related to monitoring activity under 2 of 5 categories of mechanisms: setting expectations and providing feedback. Three programme pathways were identified within the two mechanisms, two related to providing feedback and one related to setting expectations. These are:

- Providing feedback through education management information systems (EMIS) for school level management decisions (10 studies: one high, four medium and four low rigour)

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- Providing feedback through school report cards (5 studies: two high, two medium, and one low rigour)
- Setting expectations through the use of EMIS with local school development planning (SDP) (9 studies: six medium and three low rigour)

Providing Feedback: Uses of EMIS for School-level Management Decisions

Monitoring activities that aim to provide feedback for decision making at the level of the school emphasise the design, implementation and uses of information systems for education. Traditionally, education management information systems (EMIS) were viewed as a means of providing reliable and valid information to policymakers and planners about the relationship between educational inputs and educational outputs. Data might include, for example, system level resource allocation, numbers of students and staff, and school location. Increasingly, EMIS has come to be viewed not only as a tool to offer a high-level view of the system but also as a means of providing data for management decisions at the school level. Such information may include school-level details about expenditures, detailed disaggregation of student learning outcomes, and demographic characteristics. The intended programme pathway of EMIS information is to improve decision making and the targeting of resources to areas most in need through access to high-quality and timely data. The studies synthesised in this section include several descriptive accounts and overviews of the implementation of EMIS and its impact on service delivery in schools (1 high rigour - Lassibille et al., 2010; 4 medium rigour – Chen, 2011; Higgins and Rwanyange (2005); Gvirtz and Larripa (2004); World Bank (2008); 4 low rigour - ADEA, 2001; De Grauwe (2007); Murimba, 2005; World Bank, 2010).

An experimental study in Madagascar (Lassibille et al., 2010) examines the impact of EMIS at the level of the school. The findings from this study suggest that information alone had

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1
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3 little effect but the provision of information with training and support at the local level had a
4
5 sustained effect on management and student attendance. The study in Madagascar was a
6
7 randomized-control trial (RCT) and included a set of tools that were distributed to 909
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9 randomly selected schools, with 303 randomly selected control schools (Lassibille et al., 2010).
10
11 From 2005 to 2007, the control (no intervention) and four different treatments ran in parallel.
12
13 The complete set of interventions consisted of school leaders and officers at the sub-district and
14
15 district levels receiving summary reports that corresponded with their management level, along
16
17 with management toolkits and guides as well as training. One of the four treatment groups
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19 received all interventions at all levels and the three other groups received constrained variations,
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21 either by level (e.g., local only, no sub-district or district support) or type of intervention (e.g.,
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23 provision of guides only, no training). Baseline and follow-up data included data on the
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25 implementation of interventions along with test scores from standardised tests in three subjects.
26
27 The programme showed significant impacts on manager, teacher and student behaviours,
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29 particularly for the treatment group that received all interventions at all levels:
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36 In its most direct and intensive form, the interventions changed the behaviour of all
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38 actors toward better management. These changes translated immediately into increases
39
40 in student attendance and sizable reductions in dropout rates. (Lassibille et al., 2010, p.
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42 20)
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46 After two years, more than one in three (37%) treatment schools versus fewer than one
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48 in six (15% control schools were considered relatively well-managed (i.e., teachers and the
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50 director perform essential responsibilities). However, the impact on student learning was small
51
52 and not statistically significant. The study authors conclude: 'changing service providers'
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behaviour takes time and effort, and a two-year time frame was probably too short to produce clear-cut impacts on student test scores' (Lassibille et al., 2010, p. 20).

The Madagascar study was one of a series of pilot initiatives developed by AGEPA (Amélioration de la Gestion dans les Pays Africains), a regional programme that eventually included Madagascar as well as Benin, Burkina Faso, Guinea, Mali, Mauritania, Mozambique, Niger, Senegal and Togo. We reviewed a summary report of the project that was a descriptive account of project activities included in an overview of school accountability policies in sub-Saharan Africa (World Bank, 2010). The World Bank report included a more recent and more thorough reporting of activities in sub-Saharan Africa than did ADEA (2001), an earlier regional overview. The AGEPA project provided what the report described as 'high-quality, country-tailored technical support' to help countries 'define and conduct analytical work to diagnose management and accountability gaps', and from this analysis to develop practical interventions at the local, school, and classroom levels to address gaps (World Bank, 2010, p. 7). Aside from Madagascar, there were no other rigorous evaluations of impact conducted. The World Bank summary report suggests anecdotally that 'Country demand for technical assistance in the area of education and school management has been continuously growing' which it attributed in part to the success of the project (p. 3).

The SACMEQ (Southern Africa Consortium for Monitoring Educational Quality) initiative also had a substantial component of improving country infrastructure for EMIS. Murimba (low rigour) (2005) does not mention any school-level impacts in a descriptive account of the initiative, but the authors do suggest that the project improved the systems and processes for collecting and disseminating performance information, as well as building technical and strategic capacity for EMIS (p. 2).

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De Grauwe (2007) provides a panoramic view of monitoring and the implementation of Education for All in 45 low-income countries based on analyses of national policy documents. Murimba (2005) and the World Bank reports on sub-Saharan Africa (2008, 2010) offer high-level overviews of large-scale EMIS initiatives in Africa; Higgins and Rwanyange (2005) focus on the introduction of monitoring in Uganda. Chen (2011) offers a similar account of EMIS for school-level decision making in Indonesia, while Gvirtz and Larripa (2004) provide a high-level view of education monitoring in Argentina with scant evidence about school-level outcomes of monitoring activity.

The studies reviewed above allow us to establish precursors, or conditions, that are necessary for particular outcomes to arise and then infer possible mechanisms triggered by those conditions that yielded the outcomes reported or suggested. The high-rigour study of Lassibille et al., 2010, suggests that the mechanism that we label 'Follow-up/Follow-through' explains why schools that received not only information from EMIS but also received guidance and training at the district, sub-district and school levels saw the greatest improvement in school and instructional management processes. The guidance and training across levels, according to the study authors, improved classroom management through the improved oversight of school and district leadership. Knowing how to follow up and when to follow through depended on several conditions, such as the clarity of key workflow processes across levels, support in implementing key processes across levels, and consistent and clear feedback. Corresponding outcomes include the improvement of classroom management at the teacher level, increased ability of school leadership to oversee the basic functions of the school, and improvement of system leadership oversight and support of school management. Table 3 offers an overview of

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crucial relationships among conditions, mechanisms and outcomes for EMIS initiatives that aimed to influence school-level management decision making.

Table 3: C-M-O providing feedback: EMIS for school-level management decisions

Conditions	Mechanisms	Outcomes
Clarity of key workflow processes within and across classroom, school, sub-district and district levels	Follow-up/Follow-through	Classroom management improves in monitoring and following up on student absenteeism, preparing lesson plans, and tracking progress in student learning
Support in implementing workflow processes within and across levels		School management improves in carrying out supervisory and monitoring duties
Consistent and clear feedback about implementation of workflow processes and means to improve (Lassibille et al., 2010)		Sub-district and district management improves in carrying out supervisory and monitoring duties.

Providing Feedback: School 'Report Cards'

School 'report cards' are school-level information systems intended to increase accountability and transparency by making public information generated through EMIS along with individual school performance compared with performance benchmarks and local, regional, and national averages in various categories. The school report cards are intended to amplify local actors' political voice or promote parental agency through choice (Bruns et al., 2011). We concentrate in our review on system-wide initiatives around the uses of performance information for local school accountability; we do not include efforts that concentrate

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3 exclusively on community accountability independent of wider processes (for a systematic
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5 review of community accountability, see Westhorp, et al., 2014).
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9 Increasing parental and, occasionally, student roles through school report cards is an
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11 aspect of five papers in this review (2 high rigour – Andrabi et al., 2013; Barr, 2012; 2 medium
12
13 rigour – Bruns, et al., 2011; USAID 2006; and 1 low rigour – Winkler, 2005). Three of the
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15 papers concentrate on particular national or provincial implementations . Two of the country-
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17 specific papers are RCTs, one of which is an experiment in Pakistan with the dissemination of
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19 information-rich school report cards to parents (Andrabi et al., 2013) and the other of which is a
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21 ‘participatory scorecard’ initiative in Uganda (Barr et al., 2012). The third case-specific paper is
22
23 a descriptive account of a school report card initiative in Parana State, Brazil (Winkler, 2005).
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25 The remaining two papers are of medium rigour and discuss the use of school report cards in
26
27 multiple countries. These are a USAID (2006) overview of school report cards and a World
28
29 Bank report (Bruns, et al., 2011) that includes school report cards as part of a non-systematic
30
31 review of accountability-focused reforms in 11 developing countries.
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37 The high-rigour RCT studies in Uganda (Barr et al., 2012) and Pakistan (Andrabi et al.,
38
39 2013) found that the public release of clear information about the school itself yielded a desirable
40
41 impact on school management without participatory processes. In the latter study, the
42
43 anticipation of parental action by school leaders following the public release of school report
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45 cards appears to have contributed to improvements in school leaders’ oversight of instruction
46
47 that led to students’ increased test scores. The two medium- and low-rigour papers (Bruns, et al.,
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49 2011; USAID 2006; Winkler, 2005) suggest an increased likelihood of beneficial effects on
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51 service delivery and learning outcomes from combining the dissemination of school performance
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53 information with participatory processes that involve parents in collecting and analysing school-
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level information. This claim is supported by one RCT study, judged as high rigour, that finds a participatory intervention to have greater impact than one that did not include participation (Barr et al., 2012).

The high-rigour study of Andrabi and others (2013) examined the impact of including school performance and fee information and comparative data about local schools' performance and fees along with children's scores on a standardised test. Grade 3 pupils in 112 villages, comprising 800 public primary schools, were given a standardised achievement test. Report cards were then distributed to a random selection of half of the villages. Researchers conducted school and household surveys along with follow-up testing of children to determine impact. The study found that: the additional provision of information positively affected children's test score gains; was accompanied by the lowering of private school fees; and influenced parents' beliefs about school quality. Test score gains for children in treatment villages was 0.11 standard deviations higher than those in control villages; fees in private schools were 20 percent lower. Household surveys confirmed that the provision of information changed parental views of school quality, such that they closely aligned with school test scores, which the authors conclude is 'consistent with information increasing the precision of the quality signal for parents' (Andrabi et al., 2013, p.4). However, survey results suggest that changes came about primarily through the organisational responses of schools and shifts in allocation of resources towards hiring better-qualified teachers, increasing the use of textbooks and increasing the length of the school day (p. 5). School report cards did not change household investments in education (e.g., parental expenditures, time spent on education). This led researchers to suggest that household investment 'may have been directed toward greater pressure on the school rather than investments at home' (Andrabi, et al., 2013, p. 5).

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3 Barr et al. (2012) is an RCT of two variations of a school monitoring scorecard. One
4
5 hundred primary schools from districts in each of Uganda's four regions participated in a control
6
7 group (40) or one of two treatment groups (30 each). In the standard treatment group, members
8
9 of the school management committee (SMC), which comprised parents and community
10
11 members, received training in the use of a *standardised scorecard* that measured indicators
12
13 valued by the Ministry of Education. The alternative treatment included similar training in the
14
15 principles of monitoring but gave SMC members freedom to design unique scorecards for their
16
17 schools, or *participatory scorecards*. In treatment schools, the SMC collected termly data on all
18
19 indicators. Schools in the control group did not receive any intervention. The participatory
20
21 design showed statistically and economically significant effects in reducing pupil (8.9%) and
22
23 teacher (13.2%) absenteeism and a desirable effect on pupil test scores, equivalent to increasing a
24
25 pupil's standing from 50th to 58th percentile (Barr et al., 2012, pp. 16-17). The study authors
26
27 concluded that 'the participatory design component of community-monitoring interventions may
28
29 be important to their success. Delegation of this process appears to have fostered a stronger sense
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31 of ownership among school stakeholders.' The intervention did not show significant impact on
32
33 student enrolment, progression or retention.
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41 The medium-rigour World Bank publication, *Making Schools Work*, by Bruns et al.
42
43 (2011), highlights school report cards in one section (pp. 42-46). None of the high-quality studies
44
45 reviewed in this report are of school report cards; the authors draw conclusions about school
46
47 report card initiatives based on case studies and reports of small pilot studies in Brazil (the
48
49 Parana state initiative reported in Winkler, 2005), and sub-Saharan Africa, which is reviewed in
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51 the preceding section on school development planning.
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3 A low-rigour, descriptive overview of efforts in the State of Parana, Brazil, by Winkler
4
5 (2005) suggests desirable effects, with parents engaging teachers in discussions about school
6
7 improvement and an increase in parental voice in the policy deliberations of district and regional
8
9 school councils (also summarised in Bruns, et al., 2011, p. 45). Winkler comments that, ‘by
10
11 giving school-level data high visibility, school and parents’ councils became a small army of
12
13 quality controllers, reporting discrepancies in state and national databases’ (Winkler, 2005, p. 3).
14
15 Bruns, et al. (2011) summarises the state of evidence in this area in the following way:
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20 This largely qualitative and anecdotal evidence suggests that information-for-
21
22 accountability reforms might have positive impacts: greater collaborations and better
23
24 communications between parents and teachers, improved parental participation in school
25
26 matters, better and more frequent data reporting mechanisms, better resource flows, and
27
28 some suggestion of improved education outcomes. (p. 49)
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32 We did not find any suggestion of specifically undesirable effects of school report cards;
33
34 although as Bruns et al. (2011) note, the largely anecdotal and highly contextual nature of the
35
36 evidence that currently exists precludes any strong claims about desirable or undesirable effects.
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40 The two high-rigour studies concerning school report cards (Andrabi et al., 2013; Barr et
41
42 al., 2012) suggest that the horizontal mechanisms of parental engagement explain improvements
43
44 in school quality and children’s learning. Andrabi et al. (2013) proposes *parental ability to exert*
45
46 *pressure to improve school performance* as the mechanism that led school personnel to reallocate
47
48 school resources towards instructional improvement, lower school fees and make changes that
49
50 improved children’s test performance. Important conditions that we infer triggering parental
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52 pressure were initial capacity to analyse information effectively to evaluate the strengths and
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3 weaknesses of the school and relate these to areas for improvement. Barr et al. (2012) attribute
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5 parents' ability to exert pressure to the involvement of local stakeholders in monitoring activities,
6
7 making decisions around what information to collect and becoming involved in the processes of
8
9 collecting, analysing and displaying that information. We infer from this a C-M-O configuration
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11 that yields stakeholder sense of ownership, *parental participation in school monitoring*. Parental
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13 participation, according to Barr et al., may also explain reductions in pupil and teacher
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15 absenteeism in schools carrying out the participatory scorecard approach.
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Table 4: C-M-O providing feedback through school report cards

Conditions	Mechanisms	Outcomes
<p>Decisions of local stakeholder group (e.g., SMC) of consequence to school personnel</p> <p>Local stakeholders develop the capacity to use information effectively to understand school performance</p> <p>School personnel capacity to work with local stakeholders (Andrabi et al., 2013; Barr et al., 2012)</p>	<p>Parental ability to exert pressure to improve school performance (Parental pressure)</p>	<p>School leadership reallocates resources (e.g., hires better qualified teachers, more use of textbooks, increase school day)</p> <p>School fees lowered</p> <p>Children's test scores improve</p>
<p>Local stakeholders engaged in decisions around what information to collect and the process of collecting information</p> <p>Local stakeholders develop the capacity to use information effectively to understand school performance</p> <p>School personnel capacity to work with local stakeholders (Barr et al., 2012)</p>	<p>Parental participation in monitoring activity</p>	<p>Shared sense of ownership of the school among local stakeholders and school personnel</p> <p>Children's test scores improve</p> <p>Reductions in pupil and teacher absenteeism</p>

Setting Expectations: Uses of EMIS with Local School Development Planning

We now turn to the generic pathway of setting expectations as a way that EMIS intends to shape service delivery at the school level. We focus on locally-based school development

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3 planning (SDP), highlighted in nine papers (six medium- and three low-rigour papers), as a
4 means of improving the quality of data inputs and developing demand and associated capacity to
5 use performance information outputs effectively (Attfield and Vu, 2013; Brock, 2009; Bruns et
6 al., 2011; Caddell, 2005; Crouch and Winkler, 2008; Powell, 2006; Prew and Quaigrain, 2010;
7 USAID, 2006; Winkler and Herstein, 2005). Local SDP processes are presented as vehicles for
8 setting expectations through generating demand for EMIS information, developing capacity to
9 use that information effectively and increasing the quality of data inputs provided to EMIS
10 (Powell, 2006, p. 19). All the papers use descriptive accounts of existing interventions to support
11 their claims; none is an experimental or comparative study. Suggestions of desirable impact of
12 one effort in Nigeria appear in four papers, two of medium rigour (Bruns et al., 2011; USAID,
13 2006) and two of low rigour (Crouch and Winkler, 2008; Winkler and Herstein, 2005). Two
14 medium-rigour papers describe the positive impact of SDP initiatives in Vietnam (Attfield and
15 Vu, 2013) and in China (Brock, 2009). Two papers (one low and one medium rigour) suggest
16 mixed impact from an initiative in Ghana (Prew and Quaigrain, 2010; Powell, 2006), and one
17 paper of medium rigour suggests undesirable impact in a national initiative in Nepal to promote
18 local SDP (Caddell, 2005).

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41 Local SDP coupled with national or provincial EMIS is viewed in six papers as engaging
42 local school leadership more directly in the processes not only of generating plans but also of
43 determining which indicators merit measurement and being involved in the presentation and use
44 of results. Five papers report a promising initiative implemented in Kano, Nigeria (Bruns et al.,
45 2011; Powell, 2006; Winkler and Herstein, 2005; Crouch and Winkler, 2008). Crouch and
46 Winkler (2008) describe:

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3 A new collection tool and a data management system were created after soliciting input
4 from stakeholders state-wide, including central planners and managers; local education
5 officers; PTA and teachers' union members; and members of the legislature, the
6 governor's office, testing authorities, and the Ministry of Finance. In addition to
7 capturing information relevant to all stakeholders, the new information system also
8 generates multidimensional reports targeting different issues and different users, as
9 designed by the end-users themselves. (p. 27)
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20 One paper of medium-rigour provides an overview of an initiative in China (Brock,
21 2009). The initiative coupled the strengthening of EMIS at the system level with local initiatives
22 using SDPs to improve school management and promote community engagement with schools.
23 Impacts attributed to the project include increases in net enrolment from 79% in 1999 to 91% in
24 2005, with the largest increases in primary schools in remote areas and among minority girls
25 (Brock, 2009, p. 456). The authors suggest that desirable changes in student enrolment were
26 attributable to improvement in local school management that stemmed from the SDP process.
27 The author notes that as of 2010, the SDP was being advanced in 10 other provinces in China
28 (Brock, 2009, p. 457).
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41 A descriptive account of the implementation of minimum school standards in Vietnam
42 suggests that the effective use of EMIS in SDP hinged on lowering the standards that were used
43 to evaluate school-level performance, especially for schools in the most challenging
44 circumstances. The Primary Education for Disadvantaged Children project developed a set of
45 minimum standards for school quality that were then used as the basis for an annual survey of all
46 schools. Attfield and Vu (2013) comment that the existing national standards had promoted the
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3 inequitable allocation of resources to high-performing schools; the recalibrated standards, the
4 authors claim, ‘enabled accurate, quantitative benchmarking of [minimum requirements]’ (p. 83).
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9 Service-delivery outcomes were not explicitly detailed by Attfield and Vu (2013) but the
10 reports of system-level changes in response to the shift in standards as well as the mention of
11 impact at the school and classroom level suggests that recalibrating expectations enabled
12 information to be used more effectively for planning at the school level.
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19 Two papers report of an initiative to promote SDP, coupled with development of a
20 system-wide EMIS in Ghana and suggest mixed results at the level of the school but more
21 positive suggested outcomes at the district level (Powell, 2006; Prew and Quaigrain, 2010). The
22 suggested positive or mixed results of the locally-focused interventions in Vietnam, China,
23 Nigeria and Ghana run counter to a narrative account of an initiative in Nepal. Caddell (2005)
24 suggests that efforts to promote greater involvement of local school staff and community
25 members alongside the development of national EMIS capability resulted in
26 ‘participatory/micro-planning exercises’ that were more concerned with the ‘extraction of data’
27 than eliciting the input of school personnel and members of the local community. This study
28 highlights the ways in which an emphasis on technical/bureaucratic processes may lead to
29 displacing participatory aims.
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45 We propose three configurations of conditions, mechanisms and outcomes that relate to
46 the implementation of SDPs to set expectations around service delivery and learning and
47 teaching. Two of these mechanisms yield desirable outcomes, Learning from Failure and Reality
48 Testing. The third results in an undesirable impact, Lack of Follow-up/Follow-through.
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3 Brock (2009) emphasises that the Gansu Basic Education Project (GBEP) had created an
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5 environment for experimentation that encouraged school personnel to take increased long-term
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7 responsibility for their school and, at the same time, did not hold them responsible for short-term
8
9 failure. These conditions encouraged Learning from Failure within schools as well as in external
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11 relations of school to district and school to community. Brock (2009) suggests that
12
13 experimentation enabled the elaboration of operational SDPs which facilitated school-
14
15 community connections, most notably towards improving enrolment among minority girls.
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21 Attfield and Vu's (2013) account of the promulgation of new minimum school standards
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23 in Vietnam suggests a mechanism that we label Reality testing, with the intention of highlighting
24
25 how the focus on meeting basic needs led to a concrete and accurate portrayal of systemic
26
27 disparities in schooling. The public recognition of the actual state of the education system and
28
29 local schools led to more effective uses of EMIS information for planning and equitable
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31 allocation of resources at school- and classroom-levels. Reality Testing hinged on a sophisticated
32
33 EMIS infrastructure that was able to collect and disseminate accurate and timely information.
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38 Finally, setting expectations appears to be impeded by the lack of follow-up/follow-
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40 through, a mechanism that we proposed in the preceding section on providing feedback as
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42 triggered by the coherence of processes across hierarchical levels. In this instance, that of the
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44 elaboration of detailed District Educational Plans in Nepal (Caddell, 2005) through 'participatory
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46 microprocesses' at the school level, the disconnection between district and school, Caddell
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48 claims, led to local alienation rather than increased participation in taking responsibility for local
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50 school issues.
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54 Table 5: C-M-O setting expectations: Uses of EMIS for local SDP
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Conditions	Mechanisms	Outcomes
<p>Supplemental funding for implementation of a new national curriculum</p> <p>Delegation of some planning and resource allocation responsibility to school level</p> <p>Training of school leadership in education management, coupled with teacher training and development of new curricular materials</p> <p>Environment for experimentation</p> <p>(Brock, 2009)</p>	<p>Learning from failure</p>	<p>Improvements in primary school enrolment among minority girls</p> <p>Increased ownership of local education issues by school and community</p>
<p>Revised minimum school standards focused on basic inputs for learning</p> <p>EMIS infrastructure for accurate and timely monitoring and reporting of school and district-level progress against standards</p> <p>(Attfield and Vu, 2013)</p>	<p>Reality testing</p>	<p>EMIS information is used more effectively for planning and equitable allocation of resources at school- and classroom levels</p> <p>Increase in reliability of information provided by schools</p>
<p>Lack of capacity at the district level to support participatory processes at the school level</p> <p>‘Participatory processes’ are aimed at meeting the district demand for information, not local participation</p> <p>(Caddell, 2005)</p>	<p>Lack of follow-up/follow-through</p>	<p>Decreased ownership of local education issues by school and community</p>

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Discussion

We identified 22 papers focusing on monitoring. Nearly half of the monitoring papers were from Sub-Saharan Africa (n=10). An additional five papers covered multiple regions, and seven were country case studies in Latin America (n=2); East Asia (n=4) and South Asia (n=1). Three papers were judged as high rigour, 11 as medium and 8 as low. Three monitoring programme activities were identified: a) Educational Management and Information System (EMIS) for school-level management decisions, b) school report cards, and c) EMIS for local school development planning (SDP). Hypothesized domains of mechanisms identified in our initial rough theory (Figure 1) in relation to these activities included *providing feedback* through the use of EMIS for school-level management decisions, *providing feedback* through the use of school report cards, and *setting expectations* through the use of EMIS for school development planning. From the literature, we identified particular conditions that triggered specific mechanisms leading to intended or unintended outcomes in each of these categories. Specific mechanisms inferred from the literature included *follow up/follow through*, *parental ability to exert pressure*, and *parental participation in monitoring activities* for providing feedback, as well as *learning from failure* for setting expectations. We summarize the connections of these mechanisms with associated conditions and outcomes in a series of Conditions-Mechanisms-Outcomes statements in Table 6.

Table 6: Conditions-Mechanism-Outcomes (CMO) Statements

Mechanism domains	Conditions-Mechanism-Outcomes summary statements
Providing feedback through EMIS	<p>a) Information from EMIS and guidance and training provided to staff and school (<i>follow up/follow through</i>) at the district, sub-district and school-levels could lead to improvement in school and instructional management process (e.g. to monitoring absenteeism, tracking progress in student learning, school supervision and monitoring system) when there are:</p> <ul style="list-style-type: none"> • Clarity of key organisational processes within and across classroom, school, sub-district and district levels, (e.g., reporting requirements, approaches to information gathering). • Support in implementing such key organisational processes with and across levels, • Consistent and clear feedback about implementation of workflows, or ways to improve

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Mechanism domains	Conditions-Mechanism-Outcomes summary statements
<p>Providing feedback through school report cards</p>	<p>a) School report cards are likely to improve school performance by reallocating resources, reduce school fees, or improve children's test performance, through <i>parental ability to exert pressures</i>, when there are:</p> <ul style="list-style-type: none"> • Decisions from local stakeholder group (e.g., School Management Committee) of consequences to school personnel, • Local stakeholders capacity to use information effectively to understand school performance, or • School personnel capacity to work with local stakeholders <p>b) School report cards using participatory approaches could create sense of ownership among school staff and parents and other community members and may lead to the reductions in pupil and teachers absenteeism in schools, improve children's test scores, through <i>parental participation in monitoring activities</i>, when there are:</p> <ul style="list-style-type: none"> • Engagement of parents and local community members in making decisions around what information to collect and the process of collecting information, • Parents and local community members' capacity to use information effectively to understand school performance, or • School personnel capacity to work with local stakeholders
<p>Setting expectation through EMIS with SDP</p>	<p>a) Uses of Educational Management Information Systems (EMIS) for School development planning (SDP) could create an ownership of local education issues and may lead to the improvement of primary school enrolment among minority girls, triggered by <i>learning from failure</i>, when there are:</p> <ul style="list-style-type: none"> • Supplemental funding for implementation of new national curriculum • Empowerment to school level decision for planning and resource allocation • School leadership training in educational management and for new curricular materials • Environment for experimentation <p>b) Uses of EMIS for SPD could improve quality and reliability of information for school planning and equitable allocation of resources at school- and classroom-level, through a mechanism <i>of gathering information, using that information and evaluating that use in order to refine how the information is gathered and used in subsequent rounds</i>, when there are:</p> <ul style="list-style-type: none"> • Minimum school standards focusing on basic inputs for learning • EMIS infrastructure for accurate and timely monitoring and reporting of school and district-level progress against standards <p>c) Uses of EMIS for SPD could lead to decreased ownership of local education issues by school and community, triggered <i>by lack of follow-up/follow-through</i>, if:</p> <ul style="list-style-type: none"> • There are lack of capacity at district level to support participatory processes at school level • 'Participatory processes' aimed at meeting district demand for information, not Local participation driven by district, rather than community, needs.

Conclusion

Our synthesis of monitoring papers provided evidence of conditions that triggered *setting expectations* and *providing feedback/consequences*, the first and second of the five hypothesized domains of mechanisms identified in our initial theory. However, our findings also suggest that at least the first three categories of mechanisms, including those previously mentioned and the third mechanism of capacity development of educators, are inter-related and cannot be separated when explaining the ways in which monitoring leads to school-related outcomes. For example, the conditions suggested for feedback from school report cards and EMIS to have an effect include a high level of support both within the school and from higher levels in the system, as well as adequate means of communication and distribution of feedback. Such support also sets expectations in schools around standards of quality regarding learning and teaching, and in theory, may lead to the institutionalization of norms around quality, the fifth category of mechanism for which we did not find evidence.

Our findings suggest overall that capacity development of educators in particular serves as a crucial condition for monitoring to be effective. We initially hypothesized that capacity development was triggered by the provision of feedback/consequences, but our review suggests that capacity development serves as a mechanism for triggering the setting of expectations or intended responses from the provision of feedback/consequences from monitoring. Figure 3 illustrates these revisions.

The relevance of capacity development is particularly salient for low and middle income countries which often lack resources to implement such systems in the first place. Where the data use literature in high income countries emphasizes capacity of school staff to use data from monitoring systems (e.g. Schildkamp et al, 2014; Anderson et al, 2010), our review extends the

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3 notion of capacity-building to those bureaucrats, testing agencies or school inspectors who
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5 develop and implement such monitoring systems. These agents need to have the skills and
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7 resources to implement monitoring systems and provide accurate and relevant feedback to
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9 schools. This entails both the implementation of systems for monitoring and collection of data
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11 which is often problematic in schools in rural, remote areas that are difficult to access, but also
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13 the skills and attitudes of those working with these systems (e.g. school inspectors, district
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15 advisors, etc.) to provide supportive feedback to schools. In many low and middle income
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17 countries, accountability and monitoring is often understood as a tool for compliance where
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19 those providing feedback tend to choose a punitive approach in their communication with
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21 school staff where in high income countries monitoring is particularly viewed to serve school
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23 improvement and provide support. Furthermore, issues of accessing schools in rural areas,
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25 failing technology to assess students or to analyse student achievement data and aggregate
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27 scores to understand school performance reduce the ways in which data can be used to inform
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29 change.
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36 [Figure 3: Revised Theory INSERT ABOUT HERE]
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38 We continue to include in our revised theory the fourth and fifth categories of
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40 mechanisms for which we did not find evidence, capacity development of stakeholders and
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42 institutionalization of norms. Descriptive and theoretical literature on performance monitoring
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44 (e.g., Bouckaert and Halligan, 2008; Bruns et al., 2011) consider these important mediating
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46 mechanisms that enable systemic coherence and sustain continuous improvement at the system
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48 level. Nonetheless, studies have yet to establish direct contributions of either category of
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50 mechanism to sustaining improvement at the school level.
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The absence of clear evidence for three of the five program pathways that we identified is but one of the limitations that we encountered in our systematic review. The limitations of the literature that we identified made it impossible to conduct comparative analyses of accountability approaches across geographic regions or even within regions. Such work could make an important contribution to understanding how systematic variation in historical, social, organisational and cultural contexts shapes responses to system-wide accountability initiatives at the local level if it were structured to examine those contexts in depth. In subsequent reviews, conducting a preliminary comparative analysis between and among countries would be useful to identify approaches to accountability approaches that may be related in order to provide a more robust basis for comparison. In a related way, intensive studies of the interdependence of accountability initiatives within a single education system would provide valuable insight into how accountability elements operate in concert to produce various outcomes. The scope of the current review did not allow us to probe accountability processes and procedures within particular countries in a detailed way; moreover, we were unable to account for wide within-country variation that is likely to exist between districts in a particular country. Such details often shape how well approaches to accountability can best serve the public good.

The review highlights how little is known about the conditions under which and mechanisms through which performance monitoring leads to school level outcomes. Existing studies of LMICs can help us understand the pathways through which performance monitoring serves to catalyse or impede school-level outcomes. These lessons from LMICs have implications for all countries, especially in shaping the quality of schools in areas serving high poverty and marginalized communities. One area in particular stands out for further study. Our review indicated that a preponderance of systems rely on punitive mechanisms that tend to yield

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3 compliance rather than more formative, learning mindsets among school leaders and teachers.
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5 Nonetheless, findings from our review also reveal that some CMO configurations result in
6
7 approaches capable of moving beyond ‘monitoring for compliance’ towards ‘monitoring for
8
9 improvement’. Insights gleaned from such effective approaches in LMICs would also benefit
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11 schools in challenging circumstances (e.g., urban poor, isolated rural) in HICs. The initial
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13 identification of interdependent mechanisms of accountability offered in this review provides
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15 insight into salient relationships to explore in further research and suggests that future studies
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17 should specifically look at interlocking mechanisms and conditions of change.
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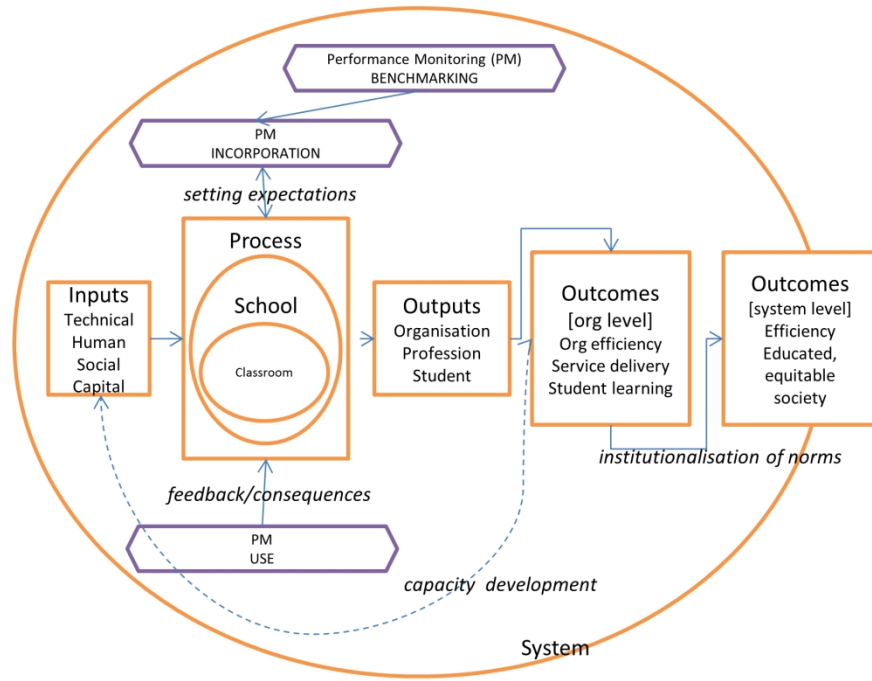
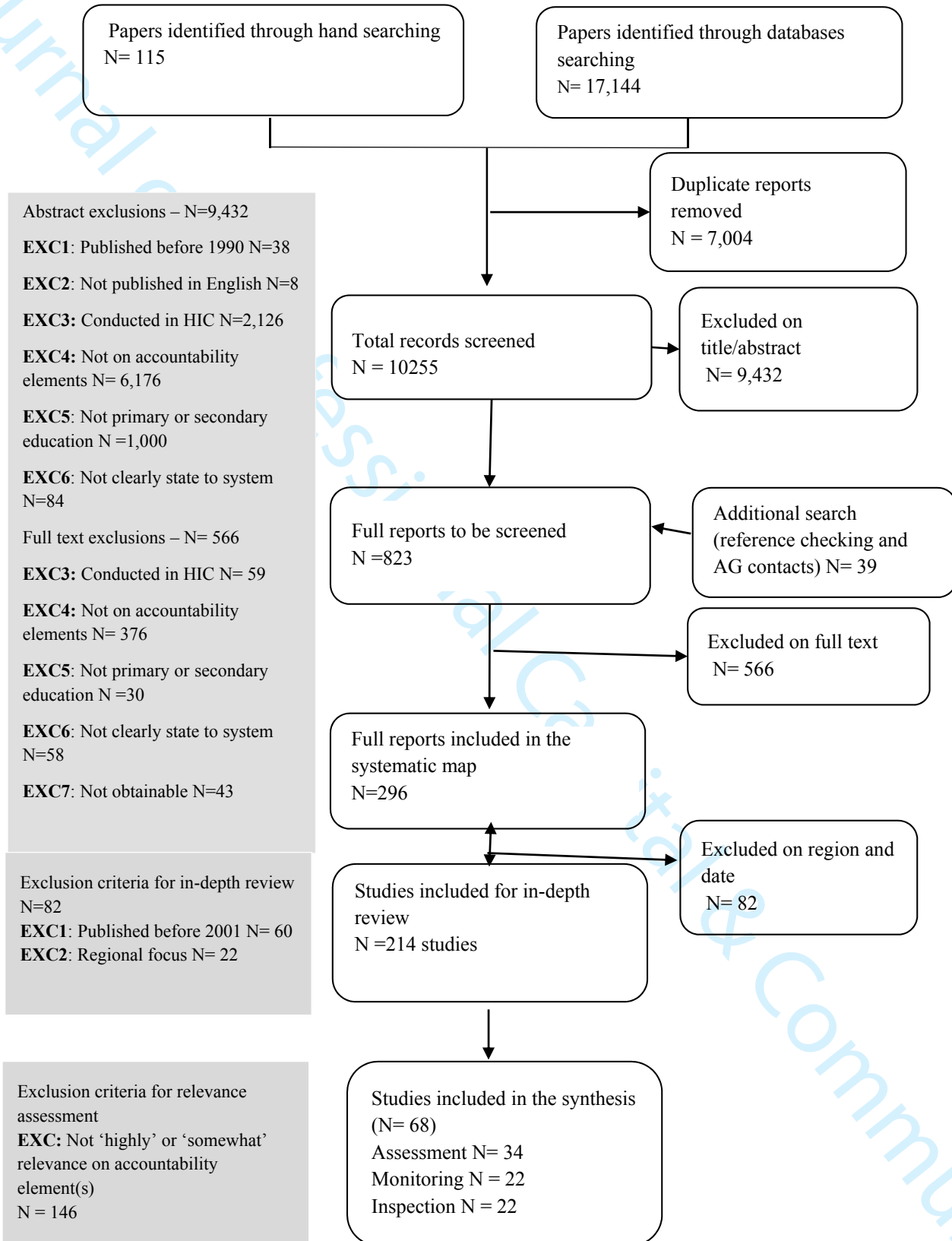


Figure 1: Initial Rough Theory



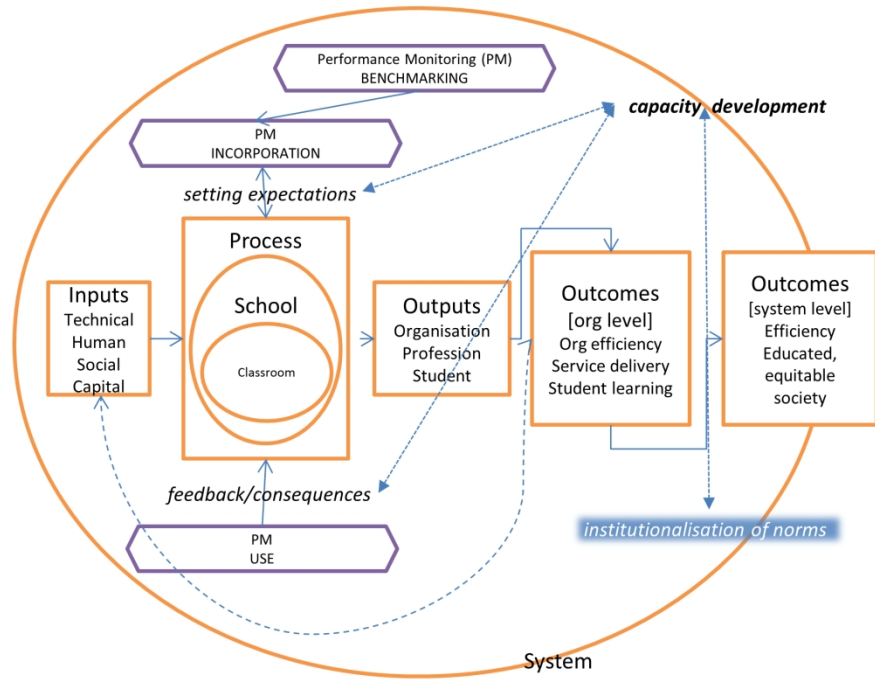


Figure 3: Revised Theory