The Elements of Teacher Effectiveness

An Evidence Review

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
Contents

Plants God Created

100 - one hundred
200 - two hundred
300 - three hundred
400 - four hundred
500 - five hundred
600 - six hundred
700 - seven hundred

Write the fractions in words

Match the fraction correctly

Write the shaded fractions

Draw the tens and ones

① God was happy with Abel and accepted it because it was good

③ God was not happy with Cain and did not accept it because it was bad

④ Cain was jealousy he took his brother in his garden and killed him from there

⑥ Cain was not fair to Abel

⑤ Cain was dishonest to Abel and God

Maths Homework Exercise

① Name the two sons of Adam

② Who was the wife of Adam?

③ _____ killed his brother after God rejected his harvest

④ Draw Abel and Cain giving God

Adam and Eve had two sons: 1 Abel and Cain
Cain was a farmer
② Abel was a sheperd
Abel and Cain give to God (thank)
Abel and Cain wanted to thank God with what they had
gave God poor harvest from his garden
Abel got a fat and good lamb from his animals

cupboard

blackboard

Acknowledgements

Introduction

Teachers play a central role in shaping the lives of young children. Successful teachers prepare children to navigate today's dynamic world by instilling foundational knowledge, cultivating higher-order skills to build on these foundations, and shaping attitudes and socio-emotional skills to apply this knowledge in their professional careers. Investing in developing effective teachers has outsized returns for society and should be a global priority.

Teacher quality is an essential determinant of student learning. Some studies suggest that being taught for one year by an exceptional teacher instead of a poor one can result in an additional year's worth of learning growth (Hanushek 1992). Evidence reveals that moving from a 10th percentile teacher to a 90th percentile teacher can increase learning by 0.36 standard deviations in Uganda (Buhl-Wiggers et al. 2017), the equivalent of two years of status-quo schooling (Evans and Yuan 2017). Similarly, in Pakistan, moving from a 5th to 95th percentile teacher improved student learning by 0.54 standard deviations (Bau and Das 2017), the equivalent of three years of status quo schooling (Evans and Yuan 2017). By the same token, ineffective teachers levy a high cost to society. Students taught by ineffective teachers learn little, lose the best years of mental development, and often drop out of school early. They face worse outcomes in life across the board.

Teaching effectively, however, is a complex job. It is made even more challenging by the lack of support and resources available to teachers in many low- to middle-income countries (LMICs). Cultivating an education system that effectively supports teachers can be costly and requires effort. But the initial monetary expense pales in comparison to the long-term economic and social costs of ineffective teaching.

What can education officials in LMICs do to improve teacher effectiveness? Many literature reviews have synthesised rigorous evidence on what works in education (Glewwe et al. 2011; McEwan 2015; Fryer 2016; Ganimian and Murnane 2016; Glewwe and Muralidharan 2016; Evans and Popova 2016; Conn 2017; World Bank 2018). We add to this literature by articulating a theoretical framework describing the elements of teacher effectiveness and how they are interrelated. We then map evidence from a comprehensive literature review to this framework, identify key barriers to effective teaching, and highlight what works to improve teacher quality. We also apply this framework and evidence to the current state of teacher effectiveness in India. The three main objectives of this report are to:

Identify the factors that influence teacher effectiveness and, by definition, student learning

Identify interventions that have successfully improved teacher effectiveness worldwide, particularly in LMICs

Benchmark the current status and performance of public-school teachers in India and identify critical issues hampering teacher effectiveness

Our goal is to empower policymakers striving to improve teaching quality in LMICs, particularly in India. This report draws on existing literature and includes evidence from academic papers, policy briefs, meta-analyses, and descriptive studies commissioned and conducted by organisations, such as the World Bank, Pratham, and UNICEF. We focus heavily on primary education as improving foundational learning is a crucial goal for many LMICs. We also focus on academic learning outcomes as measured by assessments, tests, and exams. This focus on academic outcomes is not an attempt to minimise the importance of social and emotional learning in children. Rather, our focus is driven by available evidence and current priorities in LMICs. Social and emotional outcomes are harder-to-measure concepts, with limited evidence from LMICs; these are also a lower priority in many LMIC countries (though they are encouragingly gaining increasing traction). Finally, to enable causal claims, we focus heavily on studies that use rigorous evaluation methodologies (e.g., experimental and quasi-experimental methods), where possible.

Chapter One presents a framework describing teacher effectiveness. Chapter Two presents evidence on successful interventions that have improved student learning by targeting teachers' knowledge, attitudes, and practices in public schools. Chapter Three discusses the enabling environment—the education system, its policies, investments, and institutions—in which teachers operate. Finally, in Chapter Four, we map the evidence on teacher effectiveness in India and identify key gaps for future policy focus.

Chapter One
Understanding Teacher Effectiveness

Effective teachers, by definition, improve student learning in their classrooms. They engagingly deliver the appropriate content and create a safe environment to facilitate student learning. Not surprisingly, research indicates that teacher quality is one of the main determinants of student learning (Rivkin et al. 2005; Hanushek and Rivkin 2010).

So, what makes a teacher effective?

Many frameworks have been used to understand educational performance: Wang, Haertel, and Walberg's conceptual framework that identifies 228 variables influencing student learning (1990), the Education Production Function (Brewer and McEwan 2010), the Supply and Demand of Education (Handa 2002), or one that focuses on Service Delivery Failures (World Bank 2004; Bruns et al. 2011). We draw on this literature to build a framework that places the classroom, and particularly **the teacher**, at the centre of student learning, and we start with the question, *"What is effective teaching?"*

Figure 1 presents our framework depicting the relationship between the various stakeholders involved in an education system and how they form a healthy enabling environment (or unhealthy constraining environment) for teachers.

Figure 1: Teacher Effectiveness Framework
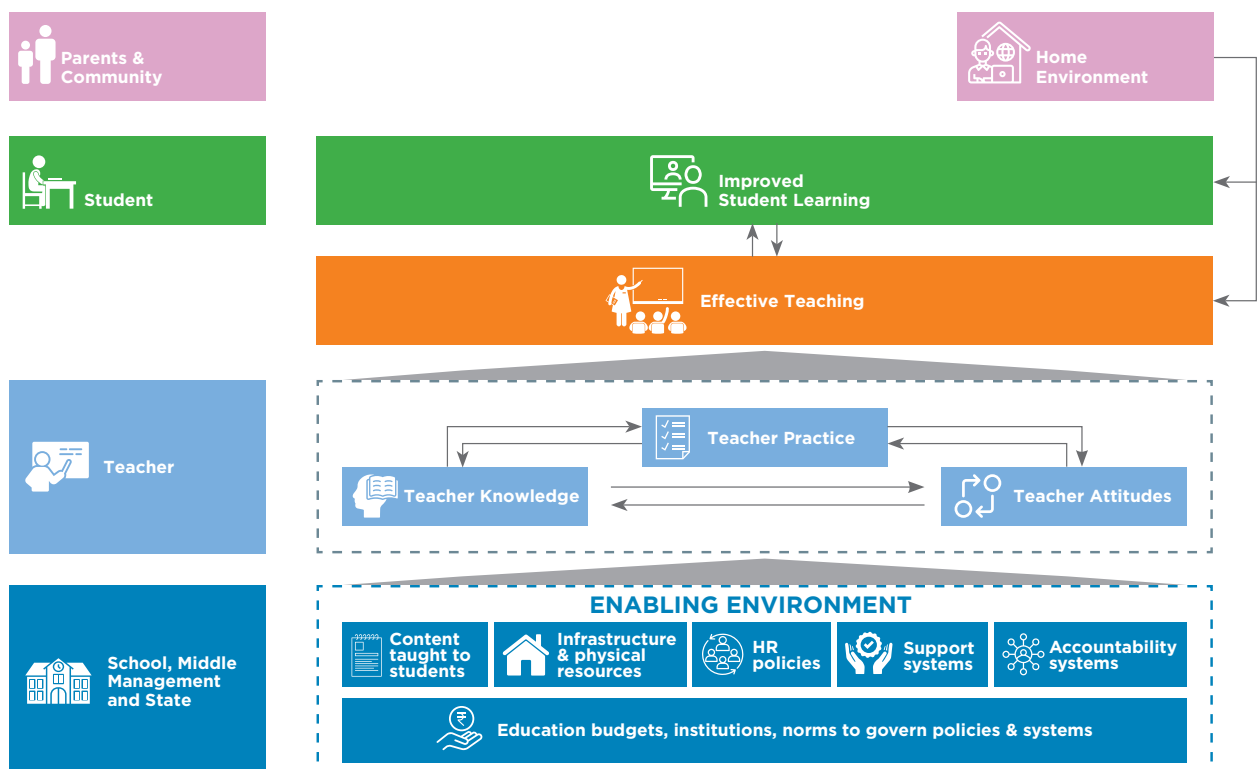
The teacher-student interactions in a classroom are at the heart of our teacher effectiveness framework. All other elements within the broader education system need to work together to facilitate this essential interaction. Importantly, our framework highlights elements, both within and outside the direct control of teachers, that affect classroom interactions. Factors within direct control of teachers include teacher practices, attitudes, and to some extent knowledge levels. Factors that are not within a teacher's direct control but still influence her effectiveness include her enabling environment (composed of other education stakeholders, policies , and institutions) and school readiness of her students. More specifically, our framework posits the following:

a. **Teacher effectiveness is primarily determined by teacher quality, which is composed of teacher knowledge, attitudes, and practice.** Deconstructing teacher quality into individual elements is challenging. We define teacher quality as characteristics the teacher has some control over, such as subject and pedagogical knowledge, attitudes toward her job and students, and classroom practices. There is increasing evidence that these individual characteristics correlate with student learning and have an interactive relationship with each other. For instance, a teacher who effectively manages a classroom has better interactions with her students, which may, in turn, improve her attitude about her job. When this teacher feels positively about her job, she is less likely to be absent and more likely to exert effort in the classroom, all of which improves her effectiveness.

b. **Stakeholders and policies in the broader education system, which are largely outside a teacher's direct control, also influence teacher effectiveness.** In our framework, we categorise the education system elements that affect teachers but are outside their direct control as part of the teacher's "enabling environment." For instance, research suggests that "teaching at the right level" is an effective pedagogical intervention. However, teachers must follow the timetable and grade-specific curriculum adopted by their educational system, even if it's the wrong level for their students. Teachers depend on the system to provide teaching and learning material (TLM) and other inputs to support their teaching. Further, their working conditions are a direct by-product of policies developed and implemented by this system. Thus, a teacher's job is inextricably linked to the stakeholders, policies, and institutions within an education system, which jointly form an enabling environment that affects classroom interactions.

c. **Finally, students' cognitive functioning, baseline learning levels, and general school readiness, influenced by their home environment, also impact teacher effectiveness.** Learning cannot happen without prepared and attentive students who are motivated to learn. A student's home environment, particularly their socio-economic circumstances, significantly shape their readiness, especially in their early years. For instance, learners who come to school hungry may have trouble concentrating in the classroom and are unlikely to learn if schools do not provide morning meals. In general, the economic circumstances of a student's family, nutrition and general health, parents' attitudes towards learning, and parental ability to make students school-ready are all important factors that affect learning.

The first part (a) of our framework closely resembles the KAP framework (Knowledge, Attitude, Practice) for behaviour change often used in Public Health Research.[1] The second part (b), classified as the "enabling environment", is somewhat adapted from the Brookings Millions Learning report (2016). Together these make up our KAP-E framework. The third part (c), "home environment", comprises essential elements that directly influence student learning but are largely outside the direct control of teachers and, to some extent, outside the direct control of education policymakers. For the education system to function smoothly, the different stakeholders described in our framework must be compatible and aligned toward the shared goal of improved student learning.

In the remainder of this report, we present empirical evidence on the different factors outlined in our framework and identify what works for improving teacher effectiveness. We limit our discussion to those elements that directly or indirectly influence teachers. Hence, while it is a critical determinant of student learning, the framework's home environment element has been deprioritised in this report.

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1. Elements of the KAP description are also adapted from the framework developed by Popova, Evans & Arancibia to describe effective teacher training (2016).

Chapter Two
Global Evidence on Teacher Effectiveness

This chapter presents evidence establishing the link between each element of teacher knowledge, attitudes, and practice (KAP) and student learning, and on teacher-focused interventions that have successfully targeted KAP. The evidence is drawn from multiple sources spanning different geographies and socioeconomic profiles.

We group the evidence by which element from our framework—teacher practice, teacher knowledge, or teacher attitudes—is targeted by an intervention. However, these are related concepts, and targeting one often affects the others. We therefore also acknowledge when a particular intervention affects other components if measured.

In this chapter, we first discuss teacher practice, followed by teacher knowledge, and then teacher attitudes. For each element, we first define it theoretically and then present the state of that element in LMICs based on descriptive studies. We conclude the chapter by discussing evidence-based strategies that have shown improvements in teacher behaviour and student learning.

2.1 Teacher Practice

Key Takeaways

Teacher practice across many LMICs in Africa, Asia, and Latin America suffers due to:
• Inadequate instructional time for students due to high teacher absenteeism
• Ineffective teaching involving inaccurate and poorly-targeted content, and poor pedagogy

There are a few different interventions that have improved teacher practice and student learning across LMICs:

Accountability-based Incentives: Tying incentives to teacher performance can promote desirable practices such as lower absenteeism

Teaching at the Level of Students: Classrooms often have students with varying levels of learning. Identifying their learning level and accordingly teaching them appropriate content improves learning

Scripting: Providing detailed but adaptable guides to teachers can help facilitate effective lessons

EdTech Interventions: EdTech can work if implemented appropriately and in the right context by complementing teacher practice or by facilitating teaching at the right level.

2.1.1 What is Teacher Practice?

Effective teaching boils down to what teachers do in the classroom or *teacher practice*.

Research confirms what is likely intuitive—the quality of teacher practice in the classroom is closely linked to student learning. A meta-analysis of evidence on teaching in the United States identified classroom instruction and classroom management—integral elements of teaching practice—as some of the most critical constructs for student learning (Wang et al. 1990). An evaluation of a program across kindergartens in Ecuador found that being randomly assigned to a teacher that exhibited better teaching practices resulted in significant increases in student language and math test scores[2] (Araujo et al. 2016). Multiple other studies across different geographies further bolster the importance of good teaching practice (discussed below).

Across teachers and contexts, good practice includes sufficient time-on-task for learners, delivery of appropriate content, quality classroom instruction, and appropriate classroom management that builds a classroom culture conducive to learning.

- **Time-on-Task** refers to the time teachers spend on learning and the extent to which students are on task (working or learning). Time off-task could occur because teachers fail to show up to school, fail to be in class while at school, or conduct non-teaching activities while in class.

  Intuitively, it seems obvious that without "spending time studying", students cannot learn. Global literature further supports the link between time on task and learning (Muijs et al. 2014). For instance, evidence from primary schools in New York indicates that effective teachers maximize time classroom time on instructional activities (Wharton-McDonald et al. 1998). Another study looking at classrooms across Latin American countries showed that less time spent on classroom instruction is associated with poorer student learning (Bruns and Luque 2014). Alternatively, an experimental study that improved time-on-task in India by increasing teacher attendance lead to improved student outcomes (Duflo et al. 2012).

- **Appropriate content** refers to the content covered during class time, often dictated by an official curriculum.

  Spending time on task is not sufficient by itself. Students must be taught appropriate content targeted to their learning levels. Evidence from Ghana, India, and Kenya suggests that when teachers check for student understanding and tailor the content to baseline learning levels, student learning improves, and heterogeneity of learning levels within classrooms reduces (Banerjee et al. 2007; Banerjee et al. 2010; Duflo et al. 2011; Duflo et al. 2020; Banerjee et al. 2016; Banerji and Chavan 2016; Muralidharan et al. 2016).

- **Classroom instruction and pedagogy** refer to how content is presented to students to build conceptual understanding. For example, teachers can deliver content through lectures, discussions, activities, assessments, and feedback.

  While teaching appropriate content is critical, it is equally important to "teach" this content in a way that maximises understanding and keeps students engaged. Across the education

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2. Teacher practices were measured by classroom observations using the "Classroom Assessment Scoring System (CLASS)". The CLASS™ tool measures "Emotional Support – positive relationships among teachers and peers, Classroom Organization – well managed classrooms that provide students with frequent, engaging learning activities, Instructional Support – interactions that teach students to think, provide ongoing feedback and support, and facilitate language and vocabulary".

literature, some consistent themes emerge on what works well and which practices do not work. Effective classroom instruction is more engaging, more interactive, incorporates assessment and feedback, and structures lessons effectively (such as providing overviews, summaries, and asking open-ended questions) (Muijs et al. 2014). Ineffective practices include uninterrupted lectures and rote learning.

• **Classroom management and culture** include ensuring that lessons run smoothly without disruptive behaviour from the students and creating a culture conducive to student learning.

Productive teacher-student interactions require effective classroom management. Great teachers go beyond teaching content; they develop relationships with students and orchestrate classrooms to make the school day more exciting. Developing effective teacher-student interactions further strengthens the transfer of knowledge to students. In general, students learn better in classrooms where they feel safe and supported, and the teacher plays a vital role in building this environment (Muijs et al. 2014).

There is a robust body of education research that shows the importance of classroom management and culture. Some recent studies from LMICs further bolster this link. For instance, a study of preschool teachers and students in Chile showed that teacher-student interaction and instruction are significant determinants of student learning (Levya et al. 2015). Another study of an early childhood education program in Ghana showed that the quality of teacher-student interactions accounted for a 0.07 - 0.17 standard deviation increase in student learning outcomes (Wolf et al. 2018).

2.1.2 What Do We Know About Teacher Practice in Low- And Middle-Income Countries?

Teacher practice across many LMICs suffers from inadequate instructional time for students and ineffective classroom teaching.

Evidence across countries in Asia and Africa highlights some of the biggest challenges afflicting teacher practice. In many countries, only a part of the time scheduled for instruction is actually used for instruction. A study in six countries across three continents found that, on average, 19 per cent of teachers were absent from school during unannounced visits[3] (Chaudhury et al. 2006). Another study that conducted classroom visits across seven Sub-Saharan African countries showed that, on average, 44 per cent of the teachers were absent from their classroom[4] (Bold et al. 2017). The same survey showed that, on average, one-third of the classrooms were "orphaned" with students present but no teachers. In general, high teacher absenteeism—either absence from school or from the classroom—is a common occurrence across many LMICs.

Even when teachers are in the classroom, they are often not teaching (Bold et al. 2017; Kothari et al. 2016). For instance, time that should be spent on instruction is often taken up by other administrative tasks that public school teachers are expected to perform (Kothari et al. 2016; Ramachandran et al. 2018). And even when teaching, teachers often don't know effective ways of utilising instructional time due to inadequate training or lack of appropriate teaching and

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3. Data on teacher absence was collected from Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda. This survey captured whether teachers were in school or not; however, since many teachers at school were not working, this figure is likely underestimated.

4. Data was collected from primary schools in seven Sub-Saharan African countries—Kenya, Nigeria, Mozambique, Senegal, Tanzania, Togo, and Uganda—which together represent close to 40 percent of the region's total population

learning materials (TLM). The study by Bold et al. across seven Sub-Saharan African countries showed that teachers demonstrated poor pedagogy in the classroom (2017). For instance, less than 50 per cent provided a lesson overview and summary; almost 40 per cent led seemingly unplanned lessons; just 17 per cent provided effective feedback to students on their writing—all essential skills that a teacher is expected to demonstrate.

Similar trends play out across many Asian and Latin American countries (Bruns and Luque 2014; Mbiti 2016; Beteille et al. 2020). Ultimately, lower instructional time coupled with poor quality instruction affects student learning in these classrooms.

2.1.3 How to Improve Teacher Practice: Evidence on What Works

Multiple reviews find that interventions targeting teacher pedagogy or classroom instruction are some of the most effective in improving student learning (Snilstveit et al. 2015; Evans and Popova 2016; Conn 2017; Evans and Acosta 2020).

In this section, we present evidence on the most effective interventions for improving teacher practice. *Table 1* provides a summary of successful programs.

Table 1: Summary of interventions targeting teacher practice

EFFECTIVE PROGRAMS TARGETING TEACHER PRACTICE	PATHWAY TO IMPACT
Accountability-based incentives	Incentives that foster increased accountability by holding teachers accountable to performance have helped improve time on task by reducing absence and motivating higher effort from teachers.
Teaching at the level of students	Classrooms in many LMICs are composed of students with widely varying learning levels. Interventions that help teachers calibrate teaching to the student learning level (such as remedial classes and 'Teaching at the Right Level' programs) and thereby teach appropriate content can overcome this challenge.
Scripting/Teacher guides	Scripting or teacher guides provide support to teachers who have lower content and pedagogical knowledge or limited time to prepare for lessons. These guides help teachers facilitate effective classroom instruction based on sound pedagogical principles. Guides that teachers can adapt and make their own are particularly effective.
EdTech Interventions	Education Technology (EdTech) complements teacher practice by introducing engaging content and content that cements student understanding. EdTech can also help adapt content to the learning level of the student.

2.1.3.a Accountability-Based Incentives

Evidence from India shows that tying attendance (or any other teacher practice) to salaries or other monetary incentives can reduce teacher absenteeism. A program in India that monitored teacher presence in a classroom with cameras and used the number of days present to determine teacher salaries improved teacher attendance. An evaluation revealed that teacher

absenteeism fell by 21 percentage points as a result of the program. Instructional time in a given class period also increased as teachers were more likely to teach when in the classroom—students in schools exposed to the program received 30 per cent more instructional time on average. Students' and teachers' additional time on task modestly improved student learning by 0.17 standard deviations compared to a control group (Duflo et al. 2012).

It is less clear if monitoring is effective on its own, without incentives tied to it. Muralidharan et al. (2016) find a correlation between school monitoring and teacher attendance in India—if a school was inspected in the last three months, teacher absenteeism was lower. But there is no experimental evidence showing that monitoring alone can positively impact attendance (Glewwe and Muralidharan 2016). Even with incentives, interventions can fail for multiple reasons (discussed in section 2.2). Getting the incentive design and implementation details right is crucial. In the example discussed above, monitoring was carried out objectively and incentives were transparently devised and disbursed, both of which were important to ensure teacher buy-in and maintain teacher motivation.

A policymaker interested in leveraging monitoring to incentivise better practice must keep in mind that monitoring untied to specific action rarely works,[5] and the action being monitored must be within the scope of teachers' abilities.[6] Most importantly, they must carefully identify the underlying reasons driving the undesirable practice and assess whether monitoring can address these.[7]

2.1.3.b Teaching at the Level of Students

Teachers are usually trained to follow a syllabus that covers content tied to a specific grade level. However, classrooms in many LMICs have students with varying learning levels, with many students far below grade level. This heterogeneity in student knowledge makes it harder to effectively teach everyone in the class, especially using the prescribed syllabus. Moreover, even if students started at grade level, covering the official curricula requires teaching at a pace that is faster than the pace of learning for most students (Pritchett and Beatty 2012). In such diverse classrooms, teachers often end up teaching to the most advanced students who can follow the curriculum and neglect those who require more help (Abadzi and Llambiri 2011). Inevitably, most students are left behind.[8] In such classrooms, the most effective strategy for improving student learning is to teach at the level of the students in the classroom, regardless of grade.

Reorganising classrooms by grouping students according to their ability and teaching each group at their level can effectively improve student learning. Several 'Teaching at the Right Level' (TaRL) interventions evaluated in India grouped students by learning levels and then delivered the corresponding level of content engagingly, effectively improved foundational reading and arithmetic skills. TaRL programs assess students to sort them by ability, train teachers to teach according to different ability levels, and provide supplementary material to facilitate tailored teaching. Evidence across different contexts shows that TaRL programs can improve student learning.

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5. Example: a program in Karnataka, India that tried incentivising healthcare workers' attendance was less effective because workers were monitored but not held accountable based on the results. The program tracked attendance using a biometric system that digitally captured staff members' thumbprints at the start and end of the day. However, the government could not effectively utilise the data results to hold staff accountable—staff neither received rewards nor penalties based on their attendance. Ultimately, there were lower than expected gains in attendance (Dhaliwal and Hanna 2017).

6. Example: one of the core drawbacks of the No Child Left Behind (NCLB) Act introduced by the US federal government in 2002 was the high-stakes student testing tied to strong punitive measures for certain stakeholders. Teachers were held disproportionately responsible for student performance. However, without proper support from policymakers (such as resources, training, policy changes etc.), teachers could only take limited action. Such a situation where teachers are held accountable for results not entirely within the scope of their abilities to change produces perverse incentives. These incentives can push teachers to focus on improving test results at the expense of authentic student learning.

7. Example: a teacher who has been appropriated for official election duty should not be penalised for her absence from the classroom on those days.

8. According to the "Global Dataset on Education Quality", more than 60 per cent of primary school children in LMICs fail to achieve a minimum proficiency in mathematics and reading (World Bank 2018)

In Ghana, an impact evaluation of the Teacher Community Assistant Initiative (TCAI) program that targeted instruction to the child's level revealed positive impacts on student learning. TCAI trained and placed teaching assistants—high school graduates from local communities—into government primary schools. Different versions of the program were tested against a control group to identify the most effective delivery mechanism. The two most effective models were the TaRL remedial classes both in-school and after school, which resulted in a 6.4 per cent and 6.2 per cent increase in test scores, respectively. While effects were highest for basic skills (numeracy and literacy), the in-school remedial initiative also improved complex skills among students, suggesting that mastering basic skills can help students learn better in more advanced topics (Duflo, A. et al. 2020). Interestingly, there was variation in impact across regions, which is likely correlated to implementation quality variations, underscoring the importance of high implementation fidelity.

Another model of the TaRL program in India—the Balsakhi program—also resulted in significant student learning gains. Pratham, an Indian NGO, ran an earlier version of the TaRL program—the Balsakhi (the 'child's friend') program—which provided remedial education for the weakest students in a classroom. Balsakhis were young women from the local communities who taught students in grades 3-4 essential competencies for two hours every day alongside regular classes. The program led to significant improvements in student learning for children who received remedial education, ranging from 0.6 to 1 standard deviations (Banerjee et al. 2007).

In addition to the two programs discussed here, multiple delivery models for TaRL have been

Figure 2: Summary of TaRL Programs
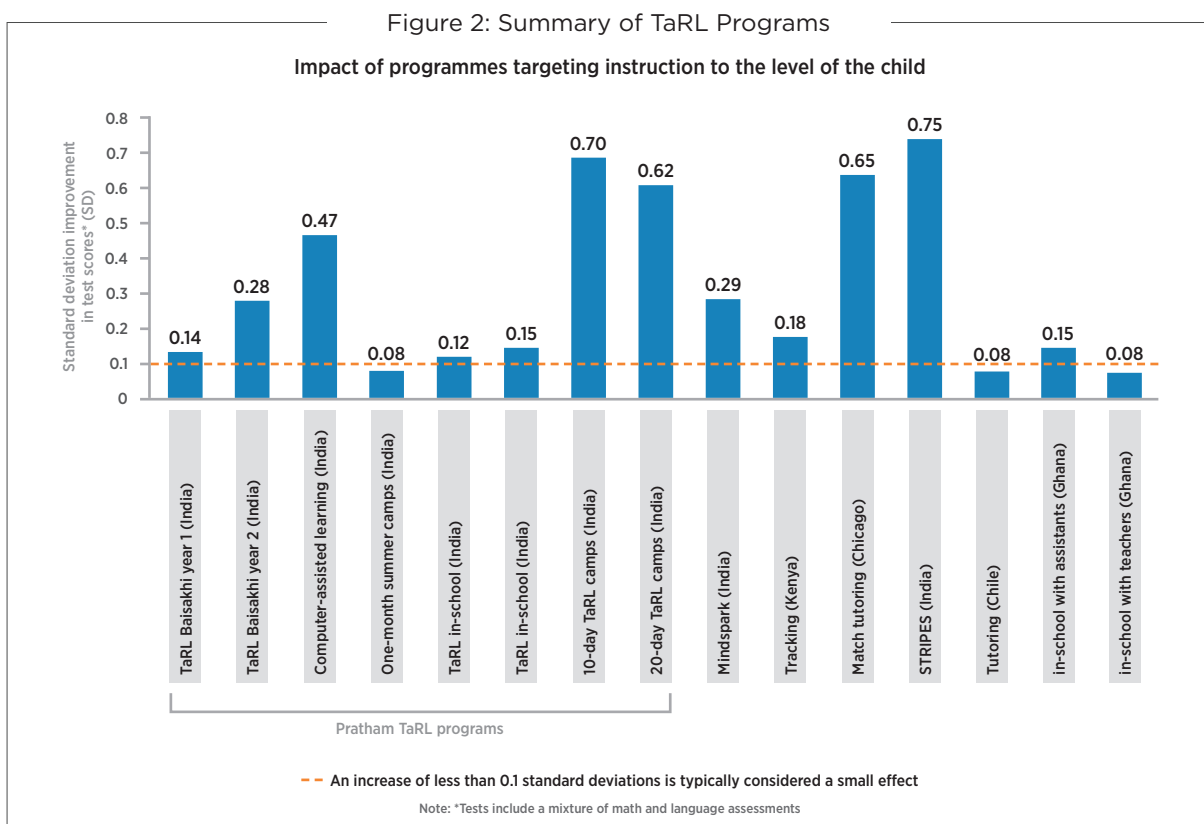
Source: Graphic adopted from the evidence page on the TaRL website

To successfully implement TaRL in most LMICs, teachers need a) information on the learning levels of their students and b) pedagogical support and incentives to customise teaching to student learning levels. Helping teachers to understand the learning levels of their students

better is necessary but not sufficient. Teachers must also have the tools and incentives to change their teaching based on this information. The outcome of the Continuous and Comprehensive Evaluation program (CCE) implemented in India illustrates this well. The CCE program mandated regular assessments of students, conducted by teachers and recorded into a government system. Teachers were asked to tailor teaching based on student learning levels, as determined by the CCE assessments, but did not receive guidance on how to do so. An evaluation revealed that teachers did not use the data to reorganise their classes or change practice. They viewed the program as an administrative burden and did the bare minimum required of them, such as conducting and uploading assessments. As a result, the program failed to improve student learning (Berry et al. 2020).

Conversely, in schools with higher-capacity and motivated teachers and flexible curriculum policies, simply helping teachers conduct diagnostic tests to gauge student learning levels can be adequate. In such contexts, assessments may result in appropriate follow-up and tailored teaching based on teachers' initiative (World Bank 2018). For example, two evaluations in the US found that an EdTech intervention, which delivered practice math questions to students and provided teachers information on student learning levels, resulted in teachers adapting instruction accordingly, ultimately improving student learning (Kelly et al. 2013; Roschelle et al. 2016). However, in the absence of these enabling factors, as is the case in most LMICs, a multi-pronged, high-touch program such as TaRL is more effective (Box 1).

Box 1: Insights on Implementing TaRL

The Indian NGO, Pratham, pioneered the TaRL approach and, since its inception in 2001, has undergone numerous randomised evaluations in India and Africa. TaRL programs have been implemented widely, furnishing numerous, rich learnings on its application.

TaRL programs have historically been more successful when implemented with volunteer or contract-based teachers as compared to government teachers. An evaluation comparing the two models revealed that contract teachers were over four times as effective as regular government teachers. The government teacher-led model improved student learning by 0.15 standard deviations, whereas the volunteer-led model increased learning by 0.70 standard deviations (Banerjee et al. 2016). Furthermore, the government teachers achieved this modest impact only with strong government-level buy-in and the addition of an extra hour to the school day. This likely reflects differential incentives for regular and contract teachers, status-quo bias preventing change among regular teachers, and other non-teaching responsibilities required of regular teachers versus contract teachers. Policymakers hoping to implement TaRL with regular government teachers can learn a lot from this evidence, including the importance of establishing the right incentives to promote behaviour change amongst teachers and creating time and space in teachers' schedule to enable change.

TaRL programs require buy-in, robust monitoring and technical support. In certain states in India (Bihar and Uttarakhand), where the program was poorly monitored, teachers assessed students but did not organise classes according to learning levels, resulting in no impact on student learning. In a different state (Haryana) where program staff closely monitored implementation, teachers executed the entire program as designed and saw improvements in learning outcomes (Banerjee et al. 2016).There was also higher buy-in among the different stakeholders in Haryana, which also contributed to greater teacher effort. In general, TaRL programs require robust monitoring, support, and general buy-in to ensure stakeholders are appropriately changing behaviour and practice.

2.1.3.c Scripting/Teacher Guides

Providing teachers with detailed lesson plans and training them to use these, also known as scripting, can improve student learning.

Teachers plan and prepare for lessons by creating lesson plans. Often, they spend significant time and effort to make these plans. In LMICs, many public school teachers lack the knowledge and skills to prepare effective lesson plans. In such contexts, providing teachers with well-designed and standardised lesson plans, or 'scripting' can improve student learning (Piper et al. 2018). Scripting enhances and standardises instruction quality by providing teachers with a sequential, step-by-step 'script' for all lessons and training them to use these scripts.

A meta-analysis of teacher guides from 19 programs across 13 LMICs revealed that programs that adopted teacher guides (or 'scripts') significantly increased student learning (Piper et al. 2018). Interestingly, the most successful guides across these programs provided some level of detail but were simple to follow and not overly prescriptive. Classroom observations revealed that teachers were likely to depart from scripts when the script was harder to follow, and such deviations diminished improvements in student outcomes. However, with better-designed guides (that is, simple and not overly prescriptive guides), teachers could adapt the guides to make them their own, which led to better student outcomes. In general, well-designed guides effectively balance teacher agency to make independent decisions alongside supporting teachers with tools and tips to apply their knowledge.

2.1.3.d Education Technology Interventions

EdTech is a broad category of educational practice that uses technology to teach. EdTech can support teacher practice in multiple ways. First, it can complement classroom instruction by providing interactive, engaging, and novel content to capture student interest. Second, teachers can use EdTech as additional instructional material, similar to homework, to help students cement understanding of concepts. For example, EdTech provides practice questions, quizzes, or games where students have to apply knowledge. Third, EdTech can facilitate 'Teaching at the Right Level' by tailoring content to each student and enabling them to work through the material at their own pace. In all these ways, EdTech can complement teachers in the classroom.

Evidence on the impact of EdTech products, when used in the right context, is optimistic.
In general, EdTech can improve student learning when the content is appropriate, when it enhances the quality or quantity of instruction, and when schools implement EdTech with fidelity. In the absence of these conditions, EdTech products can fail. Failure is particularly common in contexts where EdTech displaces highly functional status quo instruction or where the conditions are least conducive to technology use, for instance, in areas with inadequate infrastructure or where teachers' digital literacy is low.

When teachers use EdTech programs similarly to teaching and learning materials (TLM), they can provide interactive, engaging, and novel content to capture student interest. For instance, a study in Pakistan of a government implemented in-class technology (coupled with teacher training) found that students' combined math and science scores increased by 0.3 standard deviations—59 per cent higher than the control group—after just four months of exposure. The technology included short, multimedia video presentations on concepts in the curriculum and multiple-choice review questions after each lecture, all displayed in an LED screen installed in each classroom (Beg et al. 2019).

EdTech can also support teacher practice by providing material to cement student understanding of concepts and tailoring learning to student levels. In India, an experimental evaluation of Mindspark—an assessment-based EdTech tool—revealed significant gains in math and language learning outcomes (0.59 standard deviations and 0.36 standard deviations, respectively) for students in grades 4–9 (Muralidharan et al. 2019). Mindspark uses assessments to identify student learning levels and dynamically tailors all its content to the individual student's learning level. Since teachers can only deliver one lesson at a time, Mindspark supports teacher practice by catering to different classroom learning levels. The flipped classroom model offers another example of how EdTech can complement teachers. Students watch lectures online in the flipped-classroom model, and teachers use class time for activities more aligned with "active learning" (Jensen et al. 2015). Given lower internet access and computer penetration, there is no evidence of this model working in LMICs, however.

When EdTech aims to displace teacher instruction in the classroom entirely, results are often mixed. For example, in India, researchers evaluated an EdTech program designed to substitute standard math instruction time as an in-school program in schools run by a high-functioning education NGO. They found that students who experienced the EdTech program instead of the standard instruction performed worse than students who did not receive the treatment—they scored 0.57 standard deviations less than students who did not receive the program. When the same EdTech program was implemented as an out-of-school model in a different location, it complemented regular teaching and improved student learning (by 0.28 standard deviations). These results highlight the importance of carefully assessing how technology interacts with the classroom's existing teaching quality (Linden 2008). In this context, the NGO ran high-quality schools, and hence EdTech was displacing extremely high-quality instruction. In general, displacing existing teachers in the classroom will succeed only if the program's quality is higher than the teaching being displaced, which can be hard to achieve.

While EdTech has worked in multiple contexts, it can fail to improve teacher practice when not implemented well. Program design, infrastructural challenges, or a lack of adoption by stakeholders in the system can dismantle a seemingly effective program that's worked in a different context. For example, any technology will fail if teachers are not motivated to use it or don't know how to use the technology. Similarly, EdTech can fail to work if infrastructural prerequisites such as internet or consistent electricity are not available or unreliable. In such cases, EdTech may even have negative impacts by potentially displacing teacher attention and time away from students. In Ethiopia, researchers believe that frequent power interruptions and technology failures were likely behind the limited impact of television-based math instruction for high school students (Assefa 2017). Another program in Colombia, which installed refurbished computers in public schools, had no impact on student learning. Authors cited implementation challenges as teachers failed to incorporate the new technology into their classroom teaching (Barrera-Osorio and Linden 2009).

EdTech is not a silver bullet and requires careful tailoring to suit different contexts. Policymakers must identify a clear theory of change for how EdTech can improve learning in their contexts before investing in it as a solution. Additionally, implementation should be truly feasible within a given system. For instance, while EdTech offers an attractive way to bolster weak amenities and teaching levels in rural areas, these are the very areas with limited capacity to integrate EdTech. To effectively select, design, and implement EdTech interventions, policymakers should:

a. Identify the education challenges in their context, and determine how technology can address those challenges, given contextual constraints

b. Choose the right technology to address the problem identified in a), and accordingly design the program

c. Pilot, monitor, and iterate before finalising the design (Caballero-Montoya et al. 2021)

Policymakers can improve teacher practice in the classroom in multiple ways. For current teachers, they can increase the time spent on instructional activities, ensure appropriate content is delivered to students based on their learning levels, help teachers deliver lessons based on sound pedagogy, and support teachers in classroom management. These are all crucial tools in a policymaker's arsenal. However, while these tools can address the quality of teachers already in the system, they are not a replacement for more systematic reforms in teacher training and recruitment systems. High-quality training, recruiting motivated teachers, and nourishing teacher motivation are equally important to sustainably improve teacher practice in LMICs (see sections 2.2 and 2.3).

2.2 Teacher Knowledge

Key Takeaways

Teacher knowledge is often inadequate in many LMICs across Africa, Asia, and Latin America

Formal teacher education occurs at two important junctions:
- Pre-Service training or the schooling that a teacher undergoes before they are certified
- In-service training which is the ongoing training and professional development during a teacher's career

LMICs can learn a lot from training infrastructure and characteristics in countries that perform well on international measures of student learning. Key learnings are summarised below.

Qualities of effective pre-service training in high-performing countries
- High-performing countries closely link pre-service training with the education system, including aligning curriculums, and incorporating feedback from school administrators and teachers
- Training includes an extensive practical component, with classroom simulations which effectively prepare teachers to apply what they learn
- There are strict selection and advancement criteria into pre-service institutes which are transparently enforced

Qualities of effective in-service training in high-performing countries
- Trainings are focused on subject-specific pedagogy rather than general pedagogy
- Content is targeted to specific teacher needs and closely aligned to the school curriculum they will eventually teach
- Trainings are practical and involve lesson modelling and active teaching
- Trainings are regular and ongoing with consistent follow-ups
- Trainers are well-trained, with a background in education and strong local knowledge
- Teachers are motivated to participate in the trainings

2.2.1 What is Teacher Knowledge?

Effective teachers must, at the very least, know the subject content they are teaching (e.g., fractions or photosynthesis or how to read). Teachers must also possess pedagogical knowledge on how to teach content to the students.

Subject content knowledge refers to the amount and organisation of knowledge in the teacher's mind. It goes beyond an understanding of facts and concepts in the domain to also include a grasp of the subject matter structures (Schulman, 1986). In other words, teachers should be able to define facts to students, be able to explain why something is logical and essential, and connect how it relates to other points of view existing within and outside the domain (Blömeke and Delaney 2012).

Pedagogical knowledge is concerned with transferring subject knowledge effectively to students. It involves a deep understanding of how students learn and an ability to modify explanations to help students understand a given topic (World Bank 2018).

A good teacher can effectively combine these different aspects of teacher knowledge to deliver content to students.

Indeed, there is no shortage of evidence establishing a positive correlation between teacher knowledge (as measured by teacher test scores) and student learning outcomes (Hill et al. 2005; Hanushek and Rivkin 2006; Glewwe et al. 2011). For instance, a longitudinal study of American middle and high school students and their teachers revealed a positive relationship between teacher subject knowledge and student academic results (Monk 1994). Evidence from LMICs also corroborates this relationship. For instance, a study in Pakistan found that a one standard deviation increase in teacher value added estimates (TVA)[9] was associated to a 0.15 standard deviations improvement in student learning, and TVA was positively correlated to teacher content knowledge levels (Bau and Das 2020). Moreover, a study of multiple African countries revealed large, positive effects of teacher subject and pedagogical knowledge on student achievement (Bold et al. 2017). According to some estimates, around 20 per cent of the observed student performance gap between the lowest- and highest-ranked countries across **the globe is explained by teacher content knowledge (Bold et al. 2019). As one would expect, teachers who know their subjects better and know how to transfer this knowledge to students can more effectively teach students.**

2.2.2 What Do We Know About Teacher Knowledge in Low- And Middle-Income Countries?

Both subject content knowledge and pedagogical knowledge are, on average, low across many LMICs.

A study that analysed teachers across seven Sub-Saharan African countries revealed insufficient levels of subject content knowledge in math and language.[10] For instance, only 7 per cent of teachers met the minimum knowledge bar deemed appropriate for their grade in language, with uniformly low performance across the seven countries. Teachers performed slightly better in math, with almost 70 per cent of teachers possessing basic subject knowledge. However, even in math, there was wide variation. Teachers struggled with even slightly more advanced tasks; for instance, only a minority (and in some countries none) could interpret a Venn diagram or a graph (Bold et al. 2017).

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9. Value-added measures of teacher effectiveness aim to assess how much of a student's academic achievement from one year to the next is attributable to his or her teacher, as opposed to factors outside the teachers direct control

10. Data was collected from primary schools in seven Sub-Saharan African countries—Kenya, Nigeria, Mozambique, Senegal, Tanzania, Togo, and Uganda—which together represent close to 40 percent of the region's total population

Similarly, teacher pedagogical knowledge was low across the same Sub-Saharan African countries. Across six countries where data was available, teachers were assessed on their ability to organise and structure lessons and assess students[11] —skills critical for transferring knowledge and consistent with what these countries expect from their teachers. Only 10 per cent of teachers reached the minimum threshold deemed appropriate (Bold et al. 2017).

The same story persists in other LMICs in South Asia and Latin America (Bruns and Luque 2014; Beteille et al. 2020). In it important to note that while teacher knowledge is, on average, low across these geographies, there is notable variation, and highly knowledgeable teachers can be found in all countries.

2.2.3 How to Improve Teacher Knowledge: Evidence on What Works

Teacher skills typically improve with hands-on experience, but formal teacher education occurs at two critical junctures: a) pre-service training, or the schooling and preparation that a teacher undergoes before they are certified, and b) ongoing in-service training and professional development during their career.

Despite the billions of dollars spent on general teacher training each year, there is insufficient high-quality experimental evidence on its impact on teacher knowledge, much less on student outcomes (Popova et al. 2016). Pre-service trainings are hard to evaluate experimentally because, in most cases, it is infeasible to vary teacher access to training and certification. And while some school systems rely on both trained and untrained teachers, this cannot be exploited for evaluations as there are other differences between the two beyond their training (e.g., the contract structure of their employment). In the case of in-service training, there is some experimental evidence available. However, in most cases, in-service training is only one component of a bundle of reforms that are evaluated together (Popova et al. 2016). In these situations, it is hard to isolate the impact of the training on its own.

In the remainder of this section, we present the limited experimental evidence on teacher training mechanisms as well as non-experimental evidence on successful practices in pre-service and in-service training in other high-performing countries.

2.2.3.a Pre-Service Training

Most of the evidence on pre-service training comes from high-income countries and leverages observed differences in the amount and type of different teachers' qualifications to attribute causality. This evidence reveals that observable teacher qualifications such as formal education, experience levels, and certification status are not consistently related to improved student learning (Hanushek et al. 2019; Lauwerier and Akkari 2015). Furthermore, there is limited evidence on which pre-service training elements are more critical for improved student learning.

While these findings may be surprising, there could be various reasons for these uncertain results, including methodological challenges[12] in attributing causality (Harris and Sass 2011). In general, pre-service training is an important touchpoint for preparing teachers to manage classrooms effectively. Despite the methodological challenges, we can extract lessons on what

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11. Senegal was omitted from this analysis because data was collected in a different format.

12. Methodological challenges include the non-random assignment of teachers to classrooms, the prevalence of unobserved characteristics such as teacher attitudes that may affect teacher practice in the classroom, limited data on teacher training quality, among others.

works by examining the common features of pre-service training in countries that perform exceptionally well on international tests, demonstrating high-quality teaching in their schools.

High-performing countries closely link pre-service training with the education system, including aligning curriculums, and incorporating feedback from school administrators and teachers. In Japan, Netherlands, and Canada, there is regular interaction between pre-service training providers, teachers, and the school education department. Japan updates its content every ten years. The Netherlands frequently updates its pre-service curriculum based on feedback from candidates, teachers, and school administrators, ensuring relevance for teacher candidates (Jensen et al. 2016). A "tight coupling" between the private training providers and the Ministry of Education ensures teacher education coordination with national education policy goals (Bruns and Luque 2014).

Pre-service training in high-income countries includes an extensive practical component. The training in these countries is practical and includes extensive classroom simulations, more effectively preparing teachers to apply what they have learned. For instance, most programs in Shanghai contain a six-month classroom teaching component. A teacher-value-added study in the US suggests that equipping teacher trainees to do the work they will face in the classrooms leads to more effective first-year teachers and improved student learning (Boyd et al. 2008).

Pre-service training institutes in high-performing countries have strict selection and advancement criteria that are transparently enforced. Finland has rigorous examinations and candidate interviews for entry into teacher training institutions, and the process is highly competitive. In Shangai, teachers undergo significant education as a prerequisite to entering pre-service training. Advancement criteria for passing out of pre-service institutes are also strict. For instance, in Japan, teacher candidates undergo a rigorous qualifying exam testing pedagogical and subject knowledge to be certified. While licensure is not a guarantee of service quality (Hanushek et al. 2019), at the very least, meritocratic licensure may filter out extremely poor or ill-suited candidates from the teacher candidate pool.

Many LMICs are missing the key features common across pre-service institutes in high-performing countries. Many countries across Africa and South Asia have short pre-service training (1 -2 years) with limited or no time devoted to actual classroom practice. Frequently, scheduled classes are further shortened due to corruption or absenteeism among instructors. The training that does occur is theory-based with limited practical elements and an outdated curriculum, often divorced from teacher needs. Sometimes, those who provide the pre-service training are themselves not suitably qualified (World Bank 2004; Betielle et al. 2020). Additionally, the criteria for selecting candidates into these training centres are inadequate and often poorly defined (Bruns and Luque 2014; Bold et al. 2017). Many teachers enter the pre-service system with a low-level of school education, resulting in high dropouts (World Bank 2004; Bonnet 2007; Lauwerier and Akkari 2015). Together these issues result in a pre-service training system that produces ineffective teachers.

Contract teachers' success in many LMICs serves as an interesting counter to the highly trained teachers found in high-performing nations. Contract teachers typically do not have the same training levels or certification as regular teachers (they are often the ones who fail to pass pre-service certification) but have often outperformed regular teachers. A study in India that compared (non-experimentally) the impact of adding an extra contract teacher in a classroom with the impact of adding as extra regular teacher concluded that contract teachers were at least as effective as the regular teachers (who are paid more and trained more) at

improving student learning (Muralidharan and Sundaraman 2013). Another study in Kenya found that students assigned to contract teachers outperformed the regular-teacher students by 0.18 standard deviations (Duflo et al. 2012). While this evidence brings into question the need for rigorous pre-service education, experts believe that it is the differential incentives faced by contract teachers that elicit higher effort. Contract teachers are hired on fixed-term contracts, renewed based on performance, in direct contrast to regular teachers. Additionally, contract teachers typically come from the same communities as the students they teach, making them more accountable to their students' parents and perhaps making them feel a higher sense of responsibility for these students. Collectively, these qualities make contract teachers more accountable to student learning (discussed in section 2.3 on teacher attitudes).

Preparing teachers is essential and should continue to be a significant focus of education systems. However, in many LMICs, pre-service training is hard to execute well due to capacity constraints and hard to regulate and change due to the political economy that has emerged after decades of dysfunction. Many will have to rely on in-service training to improve teacher knowledge in the near to medium term.

2.2.3.b In-Service Training

Once teachers are hired, the school system's responsibility is to support them and ensure appropriate professional development. In-service training throughout the teachers' careers can help make up for gaps in prior training, introduce improvements and innovations in pedagogy, and introduce new reforms or programs.

The evidence base on in-service training is methodologically weak, similarly to the evidence on pre-service training. Most effective interventions that include teacher training also have many other design elements such as pedagogical reform or technology, and evaluations are not designed to isolate the effect of teacher training, per se. Furthermore, the limited number of experimental studies that find positive effects of stand-alone teacher training do not experimentally disentangle the specific training elements that led to success (Popova et al. 2016; Yoon et al. 2007). In the absence of conclusive, experimental evidence on specific design elements, we present evidence on design elements of successful teacher training programs and draw on theory to understand why they are important.

In general, what works in teacher training (or "teacher education") is not too different from what works in education more generally, as we describe in our framework on teacher effectiveness. It depends on the appropriateness of the curriculum and content, quality of the pedagogy, time available for instruction, the effectiveness of the teachers (here, the trainers), and receptiveness of students (here, the teachers), all of which operate in the context of an enabling environment. Since the students in this context are adults, there is also the need to incorporate certain principles specific to adult learners' professional education (Popova et al. 2016; Knowles et al. 2005).

Table 2 below summarises key design principles for effective teacher training programs.

Table 2: Design principles for in-service teacher training programs

ESSENTIAL COMPONENTS OF A GOOD TRAINING PROGRAM	DESIGN PRINCIPLES FOR IN-SERVICE TRAININGS
Component 1 **Curriculum and content of teacher trainings**	• Focus on subject-specific pedagogy rather than general pedagogy • Target content to specific teacher needs • Closely align training content with the school's curriculum • Ensure integration with the day-to-day schedule of teachers
Component 2 **Pedagogy**	• Ensure practical training sessions that include lesson modelling and active teaching • Provide supplementary material that supports training content • Ensure follow-ups to observe practice and provide feedback • Peer support and communities of practice may also be helpful
Component 3 **Time available for instruction**	• Ensure regular and ongoing training with consistent follow-ups
Component 4 **Effectiveness of trainers**	• Provide well-prepared trainers • Leverage cascade models carefully as they can dilute training quality • Ensure trainers have a background in education and relevant local knowledge
Component 5 **Receptiveness of teachers**	• Ensure teachers are motivated to participate in a training; extrinsic incentives can be leveraged to improve teacher motivation

Component 1: Curriculum and Content of Teacher Trainings

In-service teacher training should be specific and targeted (Popova et al. 2016, World Bank 2018).

Training that grounds the teaching of pedagogical skills within the context of a specific subject instead of teaching general content or abstract theory is more likely to be effective (Darling-Hammond et al. 2016; Wei et al. 2009). A review of teacher training in LMICs found that those which included a subject focus had a 0.24 standard deviation greater impact on student learning (Popova et al. 2018). For example, the Transition Maths courses administered in Johannesburg, South Africa, trained secondary grade teachers over a year and resulted in a 0.17 standard deviations increase in student learning compared to students taught by teachers who did not undergo training. Seventy-five per cent of the program's curriculum focused on core mathematics subject content and support around teaching this content. It enabled teachers to gain a deep conceptual understanding and procedural fluency in the subject (Pournara et al. 2015).

While a subject focus is essential, this does not imply that education departments should conduct all trainings in groups separated by subject (Allier-Gagneur et al. 2020). Research from Sub-Saharan Africa suggests that pedagogical subject differences become important only once basic pedagogy is mastered (Haßler et al. 2020 as cited in Allier-Gagneur et al. 2020). Hence,

for novice or poorly trained teachers who need to master basic pedagogy, combined trainings are a more cost-effective alternative.

Training content should be targeted to cater to different teachers' specific needs and profiles (Blank and Alas 2009). Expert teachers have different needs than novice teachers (McAleavy et al. 2018 as cited in Allier-Gagneur et al. 2020). Training experts on basic content or vice versa is ineffective and potentially demotivating. Organisers must, thus, account for these differential needs during training to maximise benefits to all teachers.

Finally, training is more likely to be successful if it is closely aligned with the school's curriculum and learning goals and integrated well with teachers' day-to-day schedules (Blank and Alas 2009; Darling-Hammond et al. 2016). Better alignment ensures that teachers are not unduly overburdened, and they feel comfortable trying what they learn in their classrooms without fear of repercussions.

Component 2: Pedagogy for Teacher Trainings

Training that is practical, provides supplementary material to enable the application of learnings and includes consistent follow-ups and coaching is more likely to be successful.

Practical training where teachers learn techniques by trainers modelling certain practices, and teachers themselves model classroom scenarios ('active learning') is more effective than theoretical, passive training (Blank and Alas 2009; Popova et al. 2018; Darling-Hammond et al. 2016). Without experiencing these best practices or trying them out, teachers are unlikely to change habits and implement new techniques in their classrooms (Westbrook et al. 2013; Darling-Hammond et al. 2016). A review of teacher training programs across LMICs showed that when teachers engaged in lesson modelling, there was a corresponding 0.10 standard deviation improvement in student learning (Popova et al. 2018).

Changing existing behaviour requires practising new methods repeatedly till they are automatic (Guskey 1986). This is particularly effective when done in an environment where the behaviours are expected to be duplicated, such as the classroom (Sims and Fletcher-Wood 2018 as cited in Allier-Gagneur et al. 2020). Hence, hosting trainings in school or classroom settings where teachers can leverage their environment to practice what they are learning can support such behaviour change.

There are many examples of successful teacher training programs in LMICs that leveraged practical methods over time to improve teacher knowledge. The Inter-American Partnership for Education (IAPE) is an in-depth, immersive in-service training program in Mexico. It improved[13] teacher knowledge (0.35 standard deviations) and student learning in English (0.16 standard deviations) by providing consistent, practical training over 100 hours. Twenty per cent of the training was pedagogical, with the remainder involving dynamic activities, small-group active exercises, and modelling, sustained in repeated interactions under a rhythm (Bando and Li 2014). Another program in Peru trained primary teachers through interactive workshops on science and environmental studies where teachers were given individual feedback throughout the program. The program improved[14] student learning (0.18 standard deviations) as well as teacher attitudes towards student learning (Beuermann et al. 2012) (discussed in section 2.2 on teacher attitudes).

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13. Learning gains did not persist beyond the intervention, perhaps due to a lack of teacher buy-in and continued effort to improve English skills (second language).

14. Results were driven by better-off students and those in urban areas

Providing practical and relevant teaching material alongside trainings can be helpful (Popova et al. 2016; Darling-Hammond et al. 2016). Providing supplementary tools and material enables teachers to practice the skills learned in applied training (Blank and Alas 2009). For instance, many successful training programs offered tools such as structured curriculums, specialised textbooks, workbooks, lesson plans, and video or written case studies of teaching (Albornoz et al. 2018; Allier-Gagneur et al. 2020). A study in Kenya revealed that professional development and coaching for teachers improved student learning (by 1.29 standard deviations in English and Kiswahili) only when coupled with relevant teaching and learning materials (Piper et al. 2018).

Observing classroom practice and giving teachers actionable feedback after the training can bridge the gap between learning new methods and practising them. Peers, mentors, and coaches can observe and support teachers to help cement existing knowledge. Studies across high-income and LMIC contexts have found that consistent coaching and follow-up sessions with teachers improve teacher practices and student learning (Westbrook et al. 2013; Kraft et al. 2018; Piper and Zuilkowski 2015; Cilliers et al. 2018). A study in South Africa experimentally tested the relative effectiveness of centralised teacher training vs in-person coaches and found that coaches were more effective in improving student learning. In the coaching intervention arm, specialised reading coaches visited teachers monthly, provided targeted feedback on their teaching, motivated them, and occasionally held small-group workshops. This program also leveraged other best practices, such as classroom modelling. The study did not measure teacher knowledge; however, student learning improved by 0.24 standard deviation compared to 0.12 standard deviation in centralised training (Cilliers et al. 2018).

Finally, research, particularly from high-income contexts, highlights peer support and school-based communities of practice as essential elements of in-service teacher education (Knapp 2003; Westbrook et al. 2013; Darling-Hammond et al. 2016). The viability of school-based communities of practice depends on several factors: availability of a venue, dedicated time to engage in support sessions, and support for running effective sessions (Allier-Gagneur et al. 2020). In LMICs, many of these enabling conditions may be harder to achieve, potentially diluting peer communities' effectiveness. As such, while communities of practice are touted as essential in high-income contexts, their relevance in the low-capacity contexts in LMICs is less clear. (See Box 3 on STiR.)

Component 3: Quantity of Instruction

There is limited theoretical or experimental evidence on the appropriate length and intensity of in-service training. However, the little available evidence suggests that sustained training delivered over multiple sessions is likely more successful than one-off workshops.
To effectively learn and use new strategies, teachers need time to absorb content, practice what they have learned, implement it in their classroom, and receive feedback (Darling-Hammond et al. 2016). Behaviour change does not happen overnight and requires continuous practice embedded within a feedback loop (Guskey 1986). One-off workshops do not support this learning cycle, and instead, training programs that run regularly give teachers more opportunities to engage in learning (Darling-Hammond et al. 2016; Kraft et al. 2018).

Although existing evidence suggests that longer training is more likely to improve teacher knowledge (Yoon et al. 2007), there is no clear consensus on the ideal length of training. In fact, some studies show that repeated practice which allows for multiple opportunities to support teachers on the same topic, is more important than the length of a session; and the influence of the length of a program diminishes if repeated practice is incorporated in the training program (Kraft et al. 2018 as cited in Allier-Gagneur et al. 2020).

Component 4: Trainer Quality for Teacher Trainings

As with student learning, the quality of the teacher-trainer is critical. This is particularly relevant for LMICs, where cascade models of training are widespread, mainly due to budgetary constraints. As a master trainer trains a trainer, who then trains other trainers, and so on, we are likely to see the trainers' knowledge and practices diluted with each subsequent training level (Popova et al. 2016).

Assuming that the master trainers are of high quality, reducing the number of cascades is intuitively a good way to improve the quality of in-service training. The Mango Tree NULP program in Uganda compared student outcomes between a comprehensive training model and a budget model. The budget model had fewer master trainers resulting in greater levels of cascade. This increased cascade significantly lowered student learning gains from the program, resulting in 0 – 0.15 standard deviation increases instead of the impressive one standard deviation improvement observed from the comprehensive model (Kerwin and Thornton 2015).

The profile of the trainer may also influence quality. Trainers who understand the local context and are trained as educational practitioners are more effective and are also received more openly by teachers. For instance, in a successful program in Liberia, school administrators, who were often headmasters, were nominated and trained as coaches to support teachers, leveraging their contextual knowledge and authority amongst teachers (Piper and Korda 2011).

Component 5: Motivation and Effort of Trainees

For training to be ultimately successful, teachers should be receptive to it and motivated and willing to learn and apply what they learn in their classrooms. As we discuss in the next section on teacher attitudes, this motivation can be intrinsic but often requires extrinsic incentives. Incentivising participation in the training by linking it to promotions, status, or salary bonuses can motivate teachers to participate and apply what they learn (Popova et al. 2016).

Independent of incentives, teachers are likely to be more motivated about participating in trainings they perceive to be of good quality (Allier-Gagneur et al. 2020).

Complementarities Across Components

Given the state of evidence on teacher training, it's hard to untangle which component is more important than the other. As such, we see that the most successful programs possess many, if not all, of the qualities discussed above.

Successful programs in Africa that have improved student learning included multiple components associated with high-quality in-service training, such as practical training, supplementary material, and long-term mentoring and coaching (Conn 2017). For instance, the READ program in rural South Africa provided students with high-quality books and trained teachers on ways to integrate these books into their lesson plans. The teacher training included demonstration lessons by READ mentors, monthly coaching visits by READ staff, one-on-one reflection sessions after monitoring visits, and after-school workshops for both teachers and school administrators (Sailors et al. 2010 as cited in Conn 2017). The Read to Learn program in Kenya and Uganda supported teachers through 12 days of in-service training supplemented with regular monitoring and mentoring visits;the program led to improved teacher knowledge and student learning (0.08 - 0.2 standard deviations increase in language test scores depending on country and subject) (Lucas and Mbiti 2012 as cited in Conn 2017).

Effective teacher education involves balancing the duration of the training with the available capacity, balancing the teaching of subject matter with the development of practical skills, and balancing the desire to teach to the highest international standards with the actual level of education of the entrants to teacher training (Mulkeen 2010). Many LMICs face numerous tradeoffs in designing teacher training programs. Some of the best practices quoted in this review are relatively expensive interventions that have been tested only on a small scale; they need to be modified to scale up within budgetary constraints.

Technology-supported education programs could be a sustainable and practical delivery mechanism to provide high-quality education to teachers within the context of realistic budget constraints. For instance, policymakers can use open education resources, leverage distance learning programs, or leverage virtual coaching to reduce training costs.

Distance learning could be particularly beneficial for LMICs, as they grapple with training a large teacher workforce with limited high-quality trainers. While a wide variety of distance-learning programs are used worldwide to train teachers, there is little rigorous evidence on their effectiveness, particularly from the LMIC context. Some programs have worked. For instance, an online training program that included 90 hours of courses over 15 months in the US improved instructional practice and student scores (O'Dwyer et al. 2010). However, given the limited evidence on this modality, any distance teacher training program must be carefully piloted and tested before implementation.

Similarly, virtual coaching can act as a cheaper alternative to on-site coaching. Virtual coaching has been as effective as in-person coaching in high-income countries (Kraft et al. 2013); however, the evidence from LMICs is more mixed. A program in Brazil where school leaders observed teachers and then communicated with a virtual coach to get feedback resulted in improvements in student math and Portuguese scores (Bruns et al. 2018). However, a study in South Africa found that over time, in-person coaching was over twice as effective in improving English listening than virtual coaching. The authors believe that this was because teachers exposed to virtual coaching reduced the usage of lesson plans and other supplementary material (Cilliers et al. 2020).

As promising as they can be, technology-supported interventions don't always work, with mixed results attributable to infrastructural issues, technical challenges, poor quality content, or a lack of take-up by teachers (Allier-Gagneur et al. 2020). Policymakers must carefully test technology-supported interventions to understand if they can work in their context. Ultimately, teachers need both high-quality training to learn and the motivation to apply what they know. The government and their enabling environment play an essential role in delivering this.

2.3 Teacher Attitudes

Key Takeaways

Teacher attitudes about their job and their students influence the effort with which they apply their knowledge and skills in the classroom.

Many teachers in LMIC classrooms are poorly motivated and dissatisfied with their job. They face difficult working environments and operate in low-accountability settings where performance is unlinked to rewards or penalties, creating an environment that does not incentivise effort.

How can teacher attitudes be improved?

Accountability-focused incentives: Well-designed monetary incentives tied to teacher performance can improve student learning. Incentives work only when there are existing margins for improving teacher effort or 'slack' in the system.

Support-based incentives: Supporting teachers by providing on-the-job training, individualized attention and coaching, recognition, and building a favourable work environment improves motivation and makes teachers feel valued.

Support and accountability interventions go hand-in-hand and are most effective when employed together.

2.3.1 What are Teacher Attitudes?

Teacher attitudes about their job and their students influence how they apply their knowledge and skills in the classroom. There is widespread consensus that teacher attitudes influence their teaching. There is, however, less clarity on what these attitudes are and how they are defined. Different experts and practitioners define them differently, with some believing that teacher attitudes are context-specific (Richardson 2014).

While multiple definitions of teacher attitudes abound, in this review, we define it as a composition of three main characteristics:

- **Teacher motivation:** This refers to the set of unobservable psychological factors that influence a teacher's behaviour in schools and the classroom. It is a desire to perform well at their job. Motivated teachers are willing to exert effort to perform well and invest in the continued improvement of skills over their careers.

- **Self-efficacy:** Self-efficacy is a teacher's confidence and individual belief in her capacity to control, exert, and execute behaviours necessary for her role (Bandura 1994). Teachers with higher self-efficacy are more likely to be open to new ideas, enthusiastic, and satisfied with their teaching (Guskey 1988).

- **Attitudes towards students:** Teacher aspirations and expectations from their students and their relationships with students can affect teacher performance, the classroom environment, student effort, and consequently, student achievement. Negative attitudes toward students can directly influence students' capacity to learn (Muller 2001)

2.3.1.a Teacher Motivation

Teacher motivation is the willingness, drive, or desire to engage in good teaching (Guajardo 2011). Motivation fuels teacher effort.

What motivates a teacher? Various theoretical models have been used to define teacher motivation.[15] In general, teachers are humans and are motivated by basic needs, such as financial security and living conditions (Maslow 1943). They are also employees and are therefore affected by certain motivators associated with the job, such as respect from colleagues, job security, pleasant working conditions, and support from their managers (Evans and Yuan 2018).

More broadly, beyond basic needs as humans and employees, teacher motivation is affected by incentives: environmental or psychological stimuli—both positive and negative—that elicit specific action by the teacher. These incentives can be intrinsic—arising from internal factors such as a sense of altruism or extrinsic—arising from external factors such as rewards and punishments (Ryan and Deci 2000).

Factors influencing teacher motivation often vary by context and individuals. A teacher in Finland is motivated by different things as compared to a teacher in Uganda. For instance, research reveals that in OECD countries, on average, teachers' desire and expectation of influencing their students' lives and job satisfaction are essential determinants of motivation (Bennell 2004). In contrast, teacher workload, salary, and recognition were identified as important determinants of motivation in LMICs (Bennell and Akyeampong 2007). Even within countries, motivation patterns can vary. According to one study, men in OECD countries were, on average, more motivated by extrinsic rewards such as pay. In contrast, women were, on average, more motivated by intrinsic rewards such as the satisfaction of teaching children (Bennell 2004).

Most teachers are motivated by a combination of intrinsic and extrinsic factors, which differ across contexts. Policymakers can promote effective teaching by creating conditions that meet teachers' basic needs and incentivise them in that context (Richardson 2014).

2.3.1.b Self-Efficacy

Self-efficacy is a teacher's beliefs about his ability to perform well in his job. Factors such as mastery of the content that he must teach, experiencing success in his role, having peer role models who are successful, and receiving encouragement and positive feedback from colleagues and supervisors all contribute to feelings of self-efficacy (Bandura 1977; Bandura 1994).

A sense of self-efficacy is an essential complement to, and sometimes determinant of, teacher motivation and can influence motivation positively and negatively. For example, a lack of confidence in his ability to do a good job (for various reasons, including a lack of knowledge or preparation) is likely to dampen a teacher's motivation and the amount of effort he puts towards improving performance.

2.3.1.c Attitudes Towards Students

The relationship between students and their teacher is an important building block in the

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15. These theoretical models include, but are not limited to: work-related motivation, Maslow's content theory of motivation, Porter's needs theory, Vroom's expectancy theory, intrinsic and extrinsic factors, Frase's work content and work context factors. The UNESCO and IICBA report on Teacher Support and Motivation Framework for Africa (2017) provides a detailed overview of these various theories (pg 67, Annex on the theoretical perspectives on motivation)

learning process. Strong relationships between a teacher and her students can have significant long-term positive impacts on academic achievements (Muller 2001). Teachers who have positive perceptions of their students' abilities, positive aspirations for their students and high expectations from their students can build stronger relationships. Conversely, teachers having low expectations of their students can negatively affect student learning (Muijs et al. 2014).

Teacher expectations of student performance are often influenced by characteristics such as gender, race, or ethnicity (Covington and Beery 1976). When such expectations lead to differential attention, engagement, or behaviour by the teacher towards certain students, it can harm students. For example, when a teacher has low expectations of a student, she may pay less attention to that student, reducing support and directly affecting the student's confidence and learning experience. As a result, this student's performance may suffer, further cementing the teacher's original biases and continuing the vicious cycle. **In general, teachers with uniformly high expectations of all their students are more likely to proactively put effort towards their teaching** (Hattie 2009).

2.3.2 What Do We Know About Teacher Attitudes in Low- and Middle-Income Countries?

Teachers in many classrooms in LMICs are poorly motivated and dissatisfied with their jobs (Bennell and Akyeampong 2007; Guajardo 2011; Richardson 2014). While robust data on teacher motivation across LMICs is sparse, the data that exist reveal low motivation. For instance, responses of well over a third of the surveyed teachers in primary schools across five African countries indicated that teachers were either "poorly" or "very poorly" motivated[16] (Bennell and Akyeampong 2007). While motivation varies across and within countries, there is general consensus that pockets of regions with fragile teacher motivation levels persist in many LMICs.

Teachers also face challenging working environments with features that are likely to demotivate any worker. Public-school teachers in many countries are poorly paid, overworked, experience poor working conditions, and receive minimal support from their schools (Guajardo 2011; Evans and Yuan 2018). Even in countries where teaching is a relatively better-paid job than other jobs requiring similar qualifications—such as in India—teachers often experience difficult working conditions (Anderson and Lightfoot 2019). In some LMICs, communities do not regard teaching as a prestigious or respected profession. And, teachers themselves view the profession as a 'stepping-stone' to a better career in school management or education (Evans and Yuan 2018). Many teachers take on second jobs to earn a living, which directly affects their level of preparation and readiness for class (Bold et al. 2017; Evans and Yuan 2018). Finally, teacher motivation is further affected by inadequate training, support, and a lack of basic infrastructure, which inhibit their ability to teach (Ramachandran et al. 2018).

Teachers operate in an environment that does not incentivise high performance, which further dampens attitudes and limits motivation to expend effort in the classroom. In many LMICs, education departments do not link teacher effort to compensation or career trajectory. They rarely reward high-performers (with promotions or competitive salary raises) or support poor performers. This lack of penalty or rewards tied to performance disincentivises and demotivates effort (Ramachandran et al. 2018). Low effort results in several sub-optimal behaviours, reducing both quantity and quality of instruction: teacher absenteeism in many countries is high (Kremer et al. 2005; Mbiti 2016; Muralidharan et al. 2016); even when teachers are in

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16. The survey was conducted with primary school teachers in Ghana, Lesotho, Sierra Leone, Tanzania, and Zambia

school, they are often not teaching (Mbiti et al. 2019); and even when present in the classroom, teachers often fail to teach effectively (Chaudhary et al. 2006; Bold et al. 2017).

Little empirical evidence exists on teacher confidence or attitudes toward students in LMICs. One study found that teachers in India gave lower grades to "lower-caste" students when caste was revealed compared to when caste was hidden (Hanna and Linden 2012). Beyond this, anecdotal and descriptive evidence suggests scope for improvement. Training teachers to identify their biases and invest in developing strong relationships with their students can serve as a low-cost yet important lever for improving classroom interactions.

2.3.3 How to Improve Teacher Attitudes: Evidence on What Works

In the long run, hiring the right teacher candidate will bring more motivated teachers into the system. Those who are intrinsically motivated and feel a sense of purpose about teaching or their careers are more likely to consistently put high effort into their job. Improved working conditions, a well-defined and achievable career path, and improved professional status of teaching can attract better candidates (or at the very least a wider selection of candidates) to enter the profession. Meritocratic hiring practices, coupled with rigorous support, can further elevate the quality of teaching candidates (Beteille and Evans 2019).

These changes require significant political will and mobilisation in most LMICs, all of which will take time and concerted effort. There are no shortcuts. However, as seen in well-performing countries, these policies can pave a sustainable pathway for building an effective teaching workforce.

In the short term, building motivation requires tailored, context-specific interventions that appropriately incentivise teachers based on their needs. Most of the empirical evidence on interventions for improving teacher attitudes focuses on teacher motivation, which is also the primary focus of this section. *Table 3* provides a summary of possible interventions for improving teacher motivation in LMICs.

Table 3: Summary of interventions to improve teacher motivation

TYPE OF INTERVENTION	DESCRIPTION
Accountability focused incentives	• Monetary incentives based on teacher performance can inject accountability into the system and improve student learning if designed and implemented well. Incentives can be tied to performance metrics such as student learning benchmarks or teacher attendance in the classroom
Support based incentives	• Supporting teachers by providing on-the-job training, individualised coaching, recognition for their performance, and a favourable work environment can improve motivation and make them feel valued. • Support goes together with accountability interventions. For instance, if teachers have low levels of knowledge, accountability-focussed incentives on their own are unlikely to work. In this situation, teachers will also need training and support to improve their capacity to perform better.

2.3.3.a Accountability-Focused Incentives for Teachers

Well-designed monetary incentives tied to teacher performance can improve teacher effort by increasing accountability. Pay-for-performance programs (also called merit-based pay or teacher-incentive pay) aim to improve teacher effort in the classroom by tying salaries or bonuses to specific performance criteria such as student test scores or teacher attendance.

Evidence from varied contexts reveals that incentives can work if there are existing margins for improving teacher effort or 'slack' in the system (Mbiti et al. 2019; Filmer et al. 2020). When teachers can enhance effort but are not incentivised to do so, there is 'slack' in the system. In such situations, incentives can push teachers to exert additional effort given the inputs already at their disposal. Incentive design and implementation are both important to get right to have a significant impact (see Box 2 for more on incentive design.) A meta-analysis of 44 experimental studies that evaluated teacher merit-based pay programs revealed a modest, statistically significant effect—0.052 standard deviations—on student test scores. However, the authors report widespread variation in effect sizes (from -0.37 standard deviations to 0.69 standard deviations), with effect sizes varying in response to program design and context (Pham et al. 2017).

While global evidence on linking teacher salaries or bonus pay to performance has shown mixed results, evidence from LMICs reveals greater success in these countries. Greater success in LMICs is likely due to more slack in teacher effort sustained by insufficient accountability in these countries' education systems (Ganimian and Murnane 2016; Glewwe and Muralidharan 2016).

Monetary incentives have improved student learning across India and Africa. In Andhra Pradesh, India, monetary incentives in the form of salary bonuses were tied to student test scores and resulted in increased math scores (0.28 standard deviations) and language scores (0.16 standard deviations)(Muralidharan and Sundaraman 2011). In Tanzania, performance-based bonuses to primary school teachers also improved student learning; there was a 0.21 standard deviation improvement in math and Kiswahili scores after two years. These bonuses also had widespread support from teachers with 96 per cent of teachers supporting the idea of performance pay (Mbiti et al. 2019). Similarly, monetary incentives have also improved student learning in Uganda (Gilligan et al. 2018) and Rwanda (Leaver et al. 2021).

Another program in India tied teacher salaries to the number of days they were 'present' as monitored over the camera. An evaluation found that the monetary incentive effectively reduced teacher absenteeism and improved instructional time in the classroom. The authors believe that robust top-down monitoring tied to an explicit monetary disincentive were crucial design elements for changing teacher behaviour (Duflo et al. 2012).

In contrast, monetary incentives have had short-lived impact or resulted in sub-optimal behaviour in some contexts. A randomised evaluation of a program incentivising primary school teachers in Kenya showed improvements in test scores, which disappeared once the program ended. This pattern suggests some level of 'teaching to the test' by the teachers, indicating that the incentives did not truly incentivise the desirable action—instilling students with lasting conceptual knowledge (Glewwe et al. 2008). In Tanzania, performance incentives connected to student test scores modestly improved student outcomes (impacts ranged from 0.09 - 0.19 standard deviations depending on subject and design), but the results were concentrated in schools with higher baseline learning levels and among higher-performing

students (Filmer et al. 2020). Similarly, other sub-optimal reactions to incentives occurred in Chicago's public schools, where teachers excluded weak students from testing (Jacob 2005) and cheated to achieve incentivised results (Jacob and Levitt 2003).

So, how do we interpret the mixed evidence on monetary incentives? Monetary incentives are no silver bullet, and implementation or design weaknesses can undercut their effectiveness (Mbiti et al. 2019). Policymakers must carefully pilot and identify appropriate design features for their context and ensure high-quality execution. Some important design features they must consider include:
• Carefully selecting the outcome to incentivise—teacher attendance, student test scores, percentile scores, or teacher value-added measures (Fryer 2016; Glewwe and Muralidharan 2016)
• Ensuring the outcome is understandable or deemed achievable (Fryer 2016)
• Determining the quantity of the incentive (Pham et al. 2017)
• Deciding whether the incentive is framed as a gain or loss (Fryer 2016)
• Identifying incentive recipients (individuals or schools) (Muralidharan and Sundaraman 2011; Fryer 2016)
• Establishing performance monitoring (Duflo et al. 2012; Barrera-Osorio and Raju 2017; Beteille and Evans 2019).

Successful programs in one context should be carefully adjusted, piloted, and updated for a different context.

Critics argue that pay-for-performance schemes can dampen teacher effort by eroding intrinsic motivation, attracting the wrong individuals in the first place, or demotivating good teachers and pushing them to quit (Deci and Ryan 1985 as cited in Leaver et al. 2021). However, there is limited empirical evidence in support of these claims. An innovative study that varied teacher contract structure in Rwanda revealed that pay-for-performance contracts resulted in better student learning outcomes compared to regular, fixed-wage contracts. The study found that teachers recruited by pay-for-performance (P4P) contracts were no more likely to quit and performed no worse than teachers recruited on a fixed wage contract. After recruitment, teachers were re-randomised to determine which contract they would actually receive. Teachers who finally received the P4P contracts led to greater student learning improvements over two years (0.11 standard deviations) (Leaver et al. 2021).

This evidence does not take away from the importance of intrinsic motivation in sustaining teacher effort over extended periods (the study was only for two years); however, it highlights the usefulness of extrinsic incentives for improving effort from the stock of teachers already in the system. Furthermore, the limited empirical evidence on programs that directly target intrinsic teacher motivation in LMICs is less encouraging (see Box 3 on STIR). In fact, one experimental study on healthcare workers in Zambia found that those attracted to career incentives performed better than those attracted by messages of altruism (Ashraf et al. 2020). In the long run, extrinsic incentives must work hand-in-hand with other, more intrinsic motivators to sustainably drive high teacher motivation (Richardson 2014).

Box 2: Design considerations for teacher-performance incentives

As with any program, policymakers looking to design teacher-performance incentives for their context should carefully examine local challenges, look to the global evidence base to identify the most feasible solutions, and appropriately adapt them to the local context (Bates and Glennerster 2017). When it comes to performance incentives, there are multiple features to consider.

Improvement-based vs Achieving Proficiency

Pay-for-improvement schemes connect incentives to average improvements in student test scores, as established via a baseline and endline student test. Pay-for-percentile incentives are a subset of this class of incentive systems. Pay-for-percentile systems incentivise relative improvement by tying teacher incentives to students' ranks against other students (in different classes or schools) with similar baseline test scores (Barlevy and Neal 2012).

On the other hand, proficiency-based incentives connect teacher incentives to students achieving a certain predetermined learning proficiency level.

Economic theory favours incentives like the pay-for-improvement and pay-for-percentile schemes because they encourage efforts across the entire student distribution, including weak students. They are also fairer toward teachers catering to a significant fraction of students from disadvantaged backgrounds. However, the pay-for-percentile scheme's theoretical advantages may not come to pass in practice because teachers often find them harder to understand and react to optimally (Loyolka et al. 2019; Mbiti et al. 2019). On the other hand, incentives connected to students achieving certain proficiency levels are easier to understand, perceived as more transparent, and are also easier to implement. However, these are more amenable to gaming—such as targeting students closer to the proficiency target and ignoring weaker students in the classroom.

While both types of incentives have worked in different LMIC contexts, the only study (to the best of our knowledge) that directly compared the two in Tanzania showed that the more straightforward proficiency threshold design fared better (Mbiti et al. 2019). The study revealed that while both designs improved student learning outcomes, the proficiency threshold design had a larger impact likely because it was easier for the teachers to understand.

Single Outcome vs Composite Outcome Incentives

Incentives can be tied to performance along specific outcomes such as student test scores or teacher attendance. They can also be linked to performance measured across a composite variable composed of multiple outcomes such as teacher practice, student learning, and attendance (Leaver et al. 2021; Stecher et al. 2018).

The composite outcomes design wards against narrowly focussing on a single outcome that may not be entirely within the teacher's direct control. However, composite outcomes are less transparent and harder to implement. It is also harder to collect underlying data on all the different outcomes included in the composite variable. Lastly, student learning is one of the core objectives of teaching, and incentivising intermediate outcomes may distract away from this ultimate goal.

Both single and composite outcome incentives have been successful in different contexts.

Individual vs Group Incentives

Some programs incentivise individual teachers, whereas others provide incentives to the school (also called 'group' incentives) to be distributed amongst the teachers as determined by the school. There are pros and cons to both types of incentives. Individual incentives prevent the problem of free-riding; however, they are often politically

Box 2: Design considerations for teacher-performance incentives

unpopular, and critics believe that they can negatively impact school culture when only some teachers receive compensation (LaFee 2003 as cited in Pham et al. 2017).

Both incentives have worked in some contexts and not in others. A review of 44 merit-pay programs, two-thirds of which ran in the US, found that group incentive designs were twice as effective as the average program included in the study sample (0.11 standard deviations vs 0.052 standard deviations improvement in student scores). However, there was insufficient evidence to identify the pathway for impact (Pham et al. 2017).

Evidence from LMICs paints a similarly mixed picture. A study in India found that both group and individual incentives improved student outcomes. Still, by the end of two years, the individual incentive schools scored significantly higher than group incentive ones (0.28 standard deviations vs 0.16 standard deviations) (Muralidharan and Sundaraman 2011). A program in Pakistan that offered group bonuses to teachers and was designed and implemented by the government had no impact on student learning over three years (Barrera-Osarioa and Raju 2017). In contrast, a large scale group incentive program in Chile achieved widespread success (Beteille and Evans 2019).

Ultimately, policymakers need to judge the appropriate type of incentive for their specific context.

Other Implementation Considerations

Pay-for-performance (P4P) program implementor's from South Africa and Tanzania highlight other implementation and design details to keep in mind. Foremost is establishing a high-stakes, independent testing infrastructure that forms the backbone of these schemes. Experts believe that independent testing is crucial as it creates trust and data integrity; however, the creation of tests and execution by an independent entity is also the most costly element of these schemes, particularly when operating at scale.

Another concern is the sustainability of incentive programs at scale. Most evidence cited in this section comes from NGOs implementing the programs on a small scale. Instances in which incentives were implemented at scale by the government in Kenya (Glewwe et al. 2009; Bold et al. 2019) and Pakistan (Barrera-Osorio and Raju 2017) resulted in no impact on student learning. Authors of these studies cite a combination of factors leading to a failure of incentives at scale, including poor implementation— such as delayed salaries, reduced monitoring—and political opposition.

Lastly, it is equally important to hold other stakeholders in the system accountable for learning outcomes. While teachers are on the front lines, they cannot succeed in their role without support from school management, middle-management, and top-level government players. Accountability must be built into the system at each level to drive concerted action for improvement.

In the short term, incentives can induce higher effort. However, once teachers are operating at maximum effort given the resources at their disposal, incentives on their own will be unsuccessful. They may need to be bundled with additional inputs (such as textbooks or TLM) or support (such as training) (Filmer et al. 2020). Hence, efforts to remove slack in teacher effort from the system should not detract from long-term efforts to create a pleasant working environment and effective support systems where teachers can grow.

2.3.3.b Support-Based Incentives for Teachers

Supporting teachers by providing training, individualised attention and coaching, recognition, and a favourable work environment makes teachers feel valued and improves motivation.

The Health and Literacy Intervention (HALI) instruction program in Kenya offers an excellent example of successfully supporting teachers. The program used training, lesson plans, and weekly text messages from experts to support teachers in the classroom. Experts provided both instructional and motivational support to teachers via text messages. They often framed these messages as questions and saw high teacher response rates. Experts also identified good instructional practices from teachers' responses and widely circulated these among all recipients, increasing teachers' feelings of recognition. Teachers felt valued and recognised due to this two-way communication with experts, and they more strongly identified as essential members of the teaching community. HALI improved teacher practice and, eventually, student literacy (with effect sizes up to 0.64 standard deviations) (Jukes et al. 2017).

Coaching, particularly individualised coaching, can be motivating for teachers. A study in South Africa comparing the relative effectiveness of centralised training to in-person coaching (discussed in the teacher knowledge section) found that individualised coaching improved teacher motivation more than the centralised training. Teachers that received coaching were 28.4 percentage points more likely to feel supported and recognised for their efforts (Cilliers et al. 2018).

Constant recognition of teacher effort by school leaders can also improve motivation. In the study on monetary incentives in Andhra Pradesh discussed above, teachers reported improved motivation due to the program, primarily because they felt 'recognised' for their efforts. Many teachers had previously been dissatisfied due to a lack of difference in professional trajectories between 'good' and 'bad' teachers (Muralidharan and Sundaraman 2011).

Other support-based incentives include strategies designed to enhance teachers' working conditions and provide avenues of professional growth. One way to improve working conditions is instituting transparent, supportive policies for hiring and transferring teachers. In many countries, teacher assignments and transfers are arbitrary, opaque, and contentious—harming teacher motivation (Bennell and Akyeampong 2007). Strategic, voluntary teacher transfers, on the other hand, can better match student needs and teacher skill sets. An experimental study in the US of the "Talent Transfer Initiative" found that offering teachers bonuses for relocating to underserved schools substantially increased student learning levels (Glazerman et al. 2013).

Incentivising performance without adequately supporting teachers may prove ineffective, especially if the reason for poor performance is insufficient knowledge or skills. Evans and Yuan (2018) articulate this effectively—we should have high expectations from our teachers but must, in turn, provide them with the support and working conditions in line with those expectations.

Box 3: Evidence from a program targeting teacher mindsets and motivation in India (STiR Education)

An impact evaluation of a non-profit led program targeting teacher attitudes in Indian public schools revealed limited impact on teachers or students.

The Program

STiR Education is an international NGO that seeks to improve teachers' professional mindsets and behaviours to enhance classroom practice and, consequently, student learning outcomes. To achieve this, STiR organises local networks of primary school teachers. These networks meet monthly and conduct guided, collaborative sessions, providing teachers with the opportunity to build intrinsic motivation, a growth mindset, and a professional attitude. The aim is to learn and collaboratively overcome day-to-day challenges related to teaching (Dweck 2010). Teachers are expected to take these ideas back to their classrooms and implement changes to improve their practice.

Teachers are also encouraged to reflect upon their teaching practice and to influence others around them. STiR seeks to use communities of practice to improve teachers' professional behaviour and sense of agency, and focuses on non-financial motivators linked to teacher effort.

Evaluation Results

An impact evaluation of the STiR model between 2015-2017 revealed moderate improvements in teacher motivation and student math test scores in the private school setting but no impact on either in government schools (IDinsight 2017). There are a few possible reasons for this:

- **Program-related:** STIR's 'master' teachers were responsible for diffusing training material to other teachers. These master teachers may have failed to diffuse learnings successfully. We see similar failures with other cascade-based models. STIR's program was also inconsistent with known best practices for teacher training, such as specific and active teaching. It did not offer specific, subject-based solutions connected to a teacher's grade or subject and instead provided more generic training.

- **Measurement related:** Measuring teacher motivation and attitudes is challenging, with self-reports not being fully reliable. The authors used a generic observation tool to track expected changes in teacher behaviour due to the training, but this tool may not have sufficiently measured expected changes. That being said, the program did not result in changes in more downstream outcomes such as student learning, which suggests a break down in the program's theory of change somewhere along the way.

This impact evaluation was conducted between 2015 - 2017, and STiR's program has likely evolved since then (and learned along the way). However, we have included this illustrative case study to demonstrate the challenges of building intrinsic motivation and targeting intrinsic drivers of teacher attitudes at scale in the LMIC context.

At the systems level, policy needs to advance beyond the narrow focus on recruitment, salaries, and teacher training quality to include all other dimensions impacting teachers' motivation (UNESCO 2017). While policymakers should continue pursuing these important levers, they can simultaneously focus on institutionalising support and building accountability systems to promote higher effort from teachers already in the system.

Chapter Three
The Enabling Environment for Supporting Teachers

Enabling Environment

Key Takeaways

A teacher's enabling environment is the combination of policies, institutions, and stakeholders operating within the broader education system that influence teacher effectiveness.

This includes but is not limited to:

Policies that determine content taught to students	Policies on infrastructure and other physical resources	Human resource policies that affect the teacher workforce	Investments in support systems (such as teacher training)	Policies relating to systems-level accountability

← A country's education budgets, institutions, and norms govern these policies and systems →

All the interventions discussed in Chapter 2 under teacher practice, knowledge, and attitudes operate through the teacher's enabling environment.

Additionally, some interventions indirectly influence teachers by targeting elements of their enabling environment. These range from curriculum reform to improving the quality of school management to aligning all stakeholders in the education system to improved student learning.

3.1 What is the Enabling Environment?

Teaching does not happen in a vacuum. Effective teacher-student interactions are born when many different parts of the education system come together to produce a conducive enabling environment. Almost every intervention designed to tackle the intertwined problems of poor teacher knowledge, attitudes, and practice will operate through the enabling environment, or at the very least must grapple with it.

In our theoretical framework for teacher effectiveness (Fig 1), we define a teacher's enabling environment as the combination of policies, institutions, and stakeholders within the broader education system that influence teacher effectiveness. This includes but is not limited to: a) policies that determine content taught to students, b) policies on infrastructure and other physical resources, c) human resource policies that affect the teacher workforce, d) support systems for teachers, e) and policies relating to system-level accountability.

These elements influence teacher effectiveness by impacting teacher knowledge, practices, and attitudes in various ways.

- **Policies that determine content taught to students:** In most countries, education departments mandate a grade-specific curriculum that teachers are required to follow. In many LMICs, the curriculum tends to be overambitious—starting at a higher level than student learning levels and progressing faster than most students can learn (Pritchett and Beatty 2012). This mistargeted curriculum produces classrooms composed of students of varying learning levels, with many struggling to understand the prescribed syllabus. Teachers are expected to complete the prescribed curriculum without significant deviation leaving them with little room to adapt to student learning levels. Thus, any intervention targeting teacher practices must take the heterogeneity of learning levels in the classroom, the prescribed curriculum, and teacher perceptions of expectations of them into account. In this way, the content- and curriculum-related policies directly influence teacher practices in classrooms.

- **Policies on infrastructure and other physical resources:** Education institutions are responsible for providing school infrastructure, teaching and learning materials (TLM), and other curriculum-related inputs, all of which directly affect the learning environment, teacher practice and motivation in the classroom. For instance, inadequate infrastructure— such as a lack of desks for all students, poor quality equipment, or no windows to mask noise from outside—can directly affect teacher-student interactions, hindering student learning. Furthermore, effective pedagogy often relies on TLM usage (e.g., using textbooks to guide lessons or using flip charts to demonstrate concepts), without which a teacher has limited options for delivering content engagingly.

- **Human resource policies that affect the teacher workforce and placement:** Human resource (HR) policies such as contract structure, compensation, recruitment, placement, transfers, leave, etc., can, directly and indirectly, impact teacher effectiveness. For example, modifying teacher contracts into performance-based contracts directly influences teacher attitudes and can motivate higher effort from teachers. HR policies can also indirectly influence teachers by altering how many and what type of teachers are in the workforce (which can affect the class size and consequently teacher practices) and how students and teachers are matched (through teacher transfers across regions).

- **Support systems for teachers:** Investments in teacher management and their ongoing professional development help ensure teachers are well-supported in their role once hired. Support systems include the school management and the network of education officials who directly influence teachers' working conditions. Teacher training, coaching, and mentoring are also essential support mechanisms that influence teacher knowledge and practice in the classroom and impact their motivation, mastery of content, and feelings of confidence in their abilities.

- **Policies relating to system-level accountability:** The education department's policies and actions to track performance in classrooms, schools, and beyond affect the extent to which different stakeholders are held accountable in the system. Accountability systems also enable follow-ups when things are not going as planned and hold individual actors (such as teachers, school leadership, and other school management) accountable to performance. Accountability systems vary but could include: systematically monitoring different stakeholders' actions (e.g., attendance, classroom practices, school-level support visits, region-level school infrastructure status etc.), tracking student outcomes using learning assessments (across classrooms, schools, districts, states), and systems to tie careers and other benefits to performance (Pritchett 2013).

Accountability systems rest on a foundation of robust monitoring and data collection. While monitoring data or internal information management systems (MIS) exist in many LMICs, these systems often function poorly. They primarily collect information on inputs with limited focus on indicators of teacher practice or student learning outcomes. Often, the quality of the data collected is poor because it is self-reported with incentives misaligned for reporting accurate information. Lastly, data is rarely collected and used at the appropriate frequency to feed into decision-making. Accountability systems in LMICs can, therefore, fail to influence teacher attitudes or practices.

A country's education budgets, institutions, and norms constitute the foundation that governs the policies and systems described above. Educational institutions establish and manage these policies and develop budgets to finance them, with the pervading organisational norms also influencing execution. While well-designed and well-implemented policies can improve the system's efficiency and better support teachers, opaque and unpredictable policies reduce teacher effectiveness.

Interventions typically operate through this enabling environment. For example, to execute teacher training or performance-pay interventions, the relevant education departments need to organise, allocate resources, and support implementation. Conversely, the enabling environment can moderate the level of effectiveness or, in extreme cases, eliminate any chance of success for interventions. For example, training teachers on best practices will not be successful if teachers cannot find the time to try these in class due to an overambitious curriculum. Thus, any sustainable program for improving teacher effectiveness must factor in how teachers interact with their enabling environment.

3.2 How the Enabling Environment Influences Teacher Effectiveness Indirectly

Chapter 2 discussed successful interventions that directly targeted teachers, albeit by operating through the enabling environment. For example, in-service training programs directly target teachers to improve knowledge. Many other interventions influence teacher effectiveness only indirectly, such as those that target school leadership, curriculum reform, the length of the school day and school year, placement of teachers, and the number of students they have to teach.

This section discusses experimental evidence on interventions that target the enabling environment and influence teacher-effectiveness indirectly. The policies discussed below are not an exhaustive list of tools available to policymakers; we only discuss approaches on which some experimental evidence is available.

3.2.1 Content Taught to Students

As discussed at numerous points in this report, classrooms in LMICs are highly heterogeneous, with many students multiple grade levels behind the grade in which they are enrolled. The overambitious curricula are partly responsible for this state of affairs. Policies that automatically promote students from grade to grade, regardless of proficiency, further contribute to these heterogeneous classrooms. However, teachers must follow the centrally mandated curriculum for their grades, even though it is mistargeted to their students' learning levels. Centrally driven curriculum reform is required to address these challenges;

however, in the absence of that, programs like Teaching at the Right Level (TaRL) have been highly successful.

There is limited empirical evidence on the impacts of system-wide curriculum reform. However, at a more micro level, the Teaching at the Right Level (TaRL) interventions offer an excellent example of curriculum reform that improved student learning. TaRL reorganises classrooms based on learning levels and then prescribes a curriculum for each group in the class, which is better targeted to their learning levels. There is a significant body of evidence on the effectiveness of TaRL across contexts (discussed in section 2.1.3 on teacher practices).

3.2.2 Infrastructure and Other Physical Resources

Governments have spent millions of dollars on school-based infrastructure, but this has not led to commensurate student learning improvements (Glewwe et al. 2011; World Bank 2018). Why is this the case? Are there conditions under which expenditure on infrastructure can improve teacher practice?

A meta-analysis of 43 studies across countries found that fully functioning schools—with desks, tables, chairs, rooms with a roof—are conducive to student learning (Glewwe et al. 2011). They affect teacher motivation and ability to interact with students and help students stay focused and comfortable during class.

However, access to resources is likely to be ineffective if it doesn't influence the teacher-student relationship. In Kenya, free textbook and learning resources did not improve student learning, likely because the books were too challenging for students or were withheld by school officials, leading to no changes in teacher practice or the classroom environment (Glewwe et al. 2009). Generally, how resources are used seems to be more critical than the amount of resources that school systems use (Woessman 2016). Infrastructure and resources are essential, but they work best when they can improve classroom interactions between teachers and students.

Reducing class size is another commonly proposed, albeit costly and resource-intensive, policy for improving student learning. Theoretically, teachers in smaller classes can enhance practice by providing more attention to individual student needs and adapting teaching accordingly. Yet, this doesn't always bear out in practice. Evidence reveals that smaller class sizes have at best a small, and often zero, impact on student learning. A systematic review of 127 studies across 41 countries found that smaller class size led to a slight improvement in reading achievement and no improvement in math (Filges et al. 2018). Overall, given the high costs associated with smaller class sizes (such as hiring more teachers and building new classrooms), it is unlikely to be a cost-effective or sustainable solution for schools in LMICs.

3.2.3 Human Resource Policies That Affect The Teacher Workforce

A human resource issue that policymakers in LMICs frequently grapple with is teacher turnover and transfers. Turnover is particularly high for schools in disadvantaged regions, which further disrupts students' education in already impoverished areas (Zeitlin 2020 as cited in Evans and Acosta 2020). Evidence suggests that strategic, voluntary teacher transfers can better match student needs and teacher skill sets. One experimental study in the US of the "Talent Transfer Initiative" found that offering teachers bonuses for relocating to underserved schools

substantially increased student learning levels for reading and math (Glazerman et al. 2013). However, incentive programs to recruit and retain teachers in less desirable teaching posts—in far-flung or rural regions—have had limited success in the LMIC context. A 20 per cent salary increase in Zambia had some impact on teacher retainment but no impact on student test scores (Chelwa et al. 2019). Salary premiums—up to 40 per cent—significantly increased the share of trained teachers in remote regions in The Gambia, but their impact on student achievement is unknown (Pugatch and Schroeder 2014).

Another HR lever at a policymakers disposal is teacher salaries. Regardless of placement, higher wages should, in theory, increase teachers' job satisfaction, which can improve performance. Indeed, unconditional salary increases for teachers in Indonesia improved teacher satisfaction; however, they led to no improvements in student learning or teacher effort several years after the reform (De Ree et al. 2018). Mbiti (2016) argues that this is due to a lack of accountability in the education systems in many LMICs. Since teachers are unlikely to be dismissed for poor performance, there is no incentive to improve effort even when pay is increased. If instead, they are held accountable to high-performance, with concrete action taken based on effort, they can be incentivised to expend more effort. In general, increasing salaries is not always a viable option for policymakers given budgetary constraints; however, when leveraged, it must be accompanied by corresponding action to incentivise performance.

3.2.4 Support Systems for Teachers: School Leadership and Management

The quality of school management and leadership influences teacher effectiveness across contexts. Theoretically, strong school management can better support teachers, elicit more effort and accountability from them, recruit and retain a better teacher workforce, and manage resources effectively to create better working conditions. Indeed, evidence suggests that school management's quality is positively correlated to independent measures of teacher practice, teacher value add, and student learning (Bloom et al. 2015; Fryer 2017; Lemos et al. 2020; Crawfurd 2017).

School management capacity in LMICs is relatively weak. For instance, a study using the World Management Survey reveals that India's public school management is almost two standard deviations below the average in high-income countries (Lemos et al. 2020). Similarly, evidence from Africa reveals weak management capacity in various African countries (Mbiti 2016; World Bank 2018). There is clear scope to improve school leadership and management via training and other management support programs. However, evidence on what works in LMICs to enhance the quality of management is limited.

While programs designed to improve management quality have been successful in countries like the US, evidence from LMICs is more mixed. In the US, a randomised field experiment showed that training school principals in Texas on lesson planning, data-driven instruction, and teacher observation and coaching improved student learning (Fryer 2017). Another experiment showed that borrowing and implementing the best management practices from high-performing schools into public schools also improved student performance (Fryer 2014). However, a large-scale field experiment in India of a program featuring several global "best practices" to improve management quality revealed no impact on school functioning, teachers, or students despite high implementation fidelity (Muralidharan and Singh 2020). Thus, more research is needed to understand how to design effective programs for improving management capacity at scale in the LMIC context.

School Management Committees (SMCs) and other decentralised forms of school management such as parent-teacher associations (PTA) are also potential routes to improve management

quality by increasing accountability. However, most evaluations of SMCs have found them generally ineffective, at least as stand-alone interventions (Mbiti 2016; Banerjee et al. 2010). This is likely due to operational issues faced by SMCs or limited ability to enact change without additional support (Nielson 2007; Mbiti 2016). Empowering and supporting SMCs to overcome such constraints and act on their mandate can improve student learning outcomes but generally requires additional policy interventions such as connecting SMCs to village councils, democratic elections into SMCs, or participatory school cards (Pradhan et al. 2014; Zeitlin et al. 2011).

3.2.5 System-Wide Accountability to Learning Outcomes

There is a lack of alignment of education systems across many LMICs to learning outcomes, which often promotes sub-optimal policies. In many LMICs, incentives untied to student learning often drive education policies. For instance, political pressure may induce stakeholders to invest in more visible education reforms, which are not always the most effective for improving learning. For example, investments in infrastructure development, rescinding school fees, or providing cash grants to parents are popular (and 'visible') policy tools that have limited impact on student learning or are not as cost-effective as other programs (Evans and Acosta 2020; Mbiti 2016). The impact of these programs is assessed rarely, and policymakers are seldom held accountable for improved student learning due to the program.

Perhaps one reason for the lack of alignment to student learning is the lack of independent data on student learning. Without collecting appropriate data, governments can scarcely hold stakeholders accountable to student learning. While many LMICs conduct formative assessments and collect reams of administrative data, independent learning outcomes data is scarce. Even when national and sub-national governments collect learning data, this data isn't always comprehensive and rarely used to guide government policy.

In some countries, even when monitoring and accountability systems exist, the data collected via these systems are not used for decision-making. Instead, these systems can incentivise "isomorphic mimicry"—going through the motions of what appears to be best practice without producing the ultimate objective. For example, in Tanzania and India, education officials are expected to visit schools and provide academic assistance to teachers; however, while these visits occur, they end up being mainly administrative with very little focus on teaching and learning (Mbiti 2016). A recent impact evaluation of a comprehensive program to improve school management and governance in India resulted in high administrative compliance rates but no impact on student learning. The authors argue that a likely reason was weak bureaucratic incentives that rewarded paperwork rather than learning (Muralidharan and Singh 2020).

Thus, LMICs must tackle the formidable challenge of reorienting all stakeholders in the education system—from the frontline teacher to the topmost bureaucrat—toward student learning. Perhaps one way to do this is by measuring student learning, frequently and expansively, and using this data for decisions of all types and across different government levels.

Teaching is a complex process. The various relationships depicted in our framework often work in multiple (often unpredictable) directions and have differential impacts on student learning. These relationships are in turn affected by changes in the enabling environment of teachers. Any program that aims to improve student learning needs to consistently track and adjust policies to account for this enabling environment.

Chapter Four
Evidence on Teachers in India

Teachers in India

Key Takeaways

The challenges facing Indian teachers are vast. They face unprepared learners, often in large classrooms, and with high heterogeneity in learning levels.

Like many other LMICs, teachers in Indian classrooms have poor practice, low levels of knowledge, and are poorly motivated.

Policymakers in India can invest in the following to tackle prevailing challenges and to build a better teaching workforce:

Prepare Teachers Better
- Create a database to transparently manage pre-service institutes in the country
- Improve regulation of pre-service institutes by making accreditation a continuous process and conducting independent audits
- Incorporate a significant practical component to the teaching degree
- Reform the curriculum offered by pre-service institutes and update it regularly
- Strengthen the design of the Teacher Eligibility Test (TET)

Ensure Teachers Get High-Quality Professional Development Once Hired
- Orient trainings to address classroom challenges such as heterogeneity in learning levels
- Make trainings practical, with a subject specific focus and target training based on teacher needs
- Link in-service trainings to incentives to improve participation and effort
- Monitor implementation quality of trainings and evaluate their impact to inform future trainings

Provide Continuous Feedback and Support to Teachers
- Invest in regular follow-ups with teachers post training, and in ongoing coaching
- Leverage Block Education Officers (BEO) and Cluster Resource Coordinators (CRC) to provide follow-ups connected to in-service trainings

Establish Transparent Systems to Hold Teachers Accountable for Performance
- Assess teacher performance and monitor it regularly, to better hold teachers accountable
- Tie teacher performance to career advancement and establish a transparent pathway for career growth
- Consider pay-for-performance incentives in the short-term

Improve Teacher Management Processes
- Improve the quality and design of existing data systems to improve transparency and efficiency

Use Data to Guide Policy
- Collect primary data on teacher practices, knowledge, and attitudes to gain an up-to-date and complete understanding of teachers in government schools today
- Leverage regular sample-based surveys, in addition to administrative data to understand the contexts across states and accordingly customize policies

India is at a critical juncture in its education journey. On the heels of successful efforts in improving access to education,[17] there is now the need to ensure a high-quality education for all (MHRD 2020). India's roughly 9.5 million-strong teacher workforce (UDISE 2018-19) will play a crucial role in this process.

Improving the quality of instruction in the classroom will require changes in how teachers are hired, trained, and managed. The sheer size of the teacher workforce alone makes the challenge enormous. The logistical challenges are compounded by a large number of schools (~1.5 million) spread across 29 different states and operating in an equal number of languages. Many primary students' low school readiness, a shortage of professionally trained teachers, and overly ambitious curricula are all concerns that further complicate teaching in India (Anderson and Lightfoot 2019; Beteille et al. 2020).

This chapter provides an overview of the status of teachers and their enabling environment in India. Evidence is drawn from both primary and secondary research—published and unpublished—and interviews with individual education experts in India. Based on their current status, we also propose recommendations for improving teacher effectiveness in this chapter's last section.

While we have attempted to provide a holistic picture of the state of teachers in India, many of our conclusions are based on evidence that is either dated or representative of only a few states. Conversations with education experts in India have helped corroborate these conclusions. However, as we argue in the discussion section of this chapter, up-to-date primary data on different aspects of teacher effectiveness can help individual state departments in their efforts to improve the quality of their teachers.

4.1 Background on Education in India

4.1.1 Education Policy and Administration in India

The central and state governments collaborate to deliver education in India.[18] The centre develops an overarching policy framework, and states adapt this to create contextualised policy and implementation plans. There is further decentralisation beyond the state, with the district administration managing the implementation and operationalisation of policies on the ground.

The Ministry of Education is in charge of education at the central level, with two main departments spearheading all efforts— the Department of School Education and Literacy (DSEL) and the Department of Higher Education (DHE).[19] Organisations have also been established at the central level to support the Ministry of Education and the state governments with specific responsibilities. For example, the National Council for Teacher Education (NCTE) and the National Council of Educational Research and Training (NCERT) are the apex bodies responsible for teacher training and curriculum development, among other things.

At the state level, the Samagra Shiksha Abhiyan (SSA) and the State Councils of Education Research and Training (SCERT) are academic nodal agencies, while the Directorates of Higher

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17. Over the past two decades, primary school enrolment increased sharply (from 113 million in 2000 to 120 million in 2019), pupil-teacher ratios have steadily declined (from 40 in 2000 to 27 in 2018), and access to infrastructure has dramatically improved (UDISE 2017-18; World Bank).

18. India is a quasi-federal country with twenty-nine states and seven union territories. States have significant agency in policymaking, framing and implementation across various sectors. Education is a 'concurrent subject' which means that the central and state governments have equal responsibility in handling it.

19. The Ministry of Education was formerly termed the Ministry of Human Resource Development (MHRD)

Education (DHE) and Elementary Education (DEE) are the administrative nodal agencies. The academic nodal agencies are responsible for adapting centrally developed policies around curriculum and teacher training to the state context. The administrative nodal agencies deal with responsibilities like teacher hiring and management. The academic and administrative split also continues at the block and cluster level,[20] often with roles merged due to shortage of manpower in many states (Anderson and Lightfoot 2019).

Lastly, state governments, although financially reliant on the central government, propose their own education budgets.

4.1.2 Teachers in India

Teacher education, qualification, and support services are all managed by the Ministry of Education. As per the latest data, there are roughly 9.5 million teachers in India across primary and secondary schools, of which approximately 5 million (or 52 per cent) are government school teachers. The remaining teachers belong to private schools (35 per cent), government-aided schools (9 per cent) or other types of school management (4 per cent) (UDISE 2018-19).

Schools also employ para or contract teachers, who are temporarily appointed teachers, to fill existing teacher vacancies. In 2018, roughly 13 per cent of government school teachers were contract teachers, with considerable variation in this ratio across states. For instance, contract teachers constituted a large part of the workforce in states such as Meghalaya (65 per cent), Jharkhand (57 per cent), Arunachal Pradesh (50 per cent), Odisha (39 per cent) and Sikkim (35 per cent) in 2017-18 (UDISE 2017-18). Contract teachers are paid significantly less than regular teachers and do not have access to the same benefits. They also do not typically have the same academic qualifications as regular teachers.

Teachers and headteachers commonly move between roles at the block, district, and state level throughout their careers. Some of these moves are promotions, while others are lateral transfers. Career progression depends on years of tenure. Transfers, on the other hand, are often opaque and politically motivated. Teachers and school administrators prefer administrative postings at the block, district, and state headquarters level later in their career, due to its relative stability and locational advantages (Ramachandran et al. 2018).

4.1.3 How Does One Become a Teacher?

The National Council for Teacher Education (NCTE) is a national-level body that sets the minimum requirements and qualifications (professional and education-related) for becoming a teacher. States use this guidance from NCTE to recruit teachers in their schools, often adding additional qualification criteria. In most states, the local Public Service Commission recruits teachers for government schools.

Candidates must meet two main qualifying requirements to become teachers: 1) undergo pre-service education to earn an education degree and 2) pass the Teacher Eligibility Test (TET).

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20. Blocks and clusters are administrative sub-divisions of regions in India into smaller units to facilitate effective management and administration of services.

4.1.3.a. Pre-Service Education

The main NCTE guidelines for pre-service education vary for primary and secondary grade teachers. Generally, candidates require a degree. The degree can be a Diploma for primary grade teachers and a Bachelor in Education (BEd) or Master in Education (MEd) for secondary grade teachers. Aspiring teachers must meet minimum performance requirements to earn these degrees, which vary depending on the education board under question.[21]

Various pre-service degrees are available for aspiring teachers in the country, such as the MEd and BEd degrees offered by different institutes and the diplomas offered by the government-led District Institutes for Education and Training (DIET). At present, there are over 170 Colleges of Teacher Education and over 17,000 Teacher Training Institutes across India, 92 per cent of which are private (MHRD 2019 as cited in Anderson and Lightfoot 2019). Of the programs recognised by NCTE, the BEd is the most commonly taken, constituting approximately half of the teachers trained each year (Ramachandran et al. 2018).

4.1.3.b. Teacher Eligibility Test

In 2011, a national qualification exam—the Teacher Eligibility Test (TET)—was also introduced to standardise the quality of pre-service training of teachers across states and schools. Aspiring candidates in any state must achieve a minimum score of 60 per cent on the TET to qualify for recruitment. While there is a Central TET, many states also design and implement their own TETs that candidates applying in these states must pass. At the primary level (grades 1 to 5), 20 per cent of the Central TET (CTET) focuses on child development and pedagogy, and 80 per cent is subject-focused (language, mathematics, etc.) For upper primary and middle school levels, 20 per cent of the CTET focuses on child development and pedagogy, 40 per cent on either mathematics, science, or social studies, depending on teacher choice. The remaining 40 per cent focuses on language (Ramachandran et al. 2018).

While these tests are needed to become a teacher, in practice, criteria are often relaxed when the demand for teachers is greater than the supply (Anderson and Lightfoot 2019; Beteille et al. 2020). Contract teachers, for example, are often hired to address teacher vacancies, and many do not have recognised teaching degrees.

4.1.4 Teacher Professional Development

Beyond the pre-service education teachers receive while earning their degree or diploma, teachers also receive in-service training once recruited. These trainings are organised at the state level by SCERT and at the district or lower level by a network of District Institutes for Education Training (DIETs) and other institutions. According to the NCTE, teachers must receive a minimum of 20 days of in-service training each year, with more training for new recruits. In-service trainings are planned and financed by the Samagra Shiksha Abhiyan—an integrated school education scheme across all grades (Ramachandran et al. 2018). In practice, non-state actors and district and local government actors often supplement existing teacher training provided by governments to enhance effectiveness and reach.

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21. There are different education boards in India depending on the government body responsible for regulating and supervising the curriculum and advancement requirements and schedules. For example, the SCERT regulates the state boards present in most Indian states; the Ministry of Education directly regulates the Central Board of Secondary Education (CBSE).

4.2 The State of Teachers in India

The challenges facing Indian teachers are vast. They face unprepared learners, often in large classrooms, and with high heterogeneity in learning levels (Beteille et al. 2020; ASER 2018). Teachers not only deal with students who cannot study at the level of their current classroom, but they must also frequently teach multigrade classrooms—for which they are not formally trained (Ramachandran et al.2018). Further, inadequate leadership in schools, particularly in small schools, affects the working conditions faced by teachers and the level of support they receive (Beteille et al. 2020).

Characteristics of the enabling environment facing these teachers further compound the problem. Weak accountability systems, which are unaligned to student learning, are unable to incentivise appropriate teacher effort. Suboptimal professional norms about the role and expectations of a teacher persist, contributing to undesirable practices. Above all, politically powerful teacher unions often jeopardise the enactment of reforms that they perceive as threats to teacher interests (Beteille et al. 2020; Ramachandran et al. 2018).

The contextual factors surrounding education expansion in India are likely partly responsible for the proliferation of poor professional norms and teacher practices in government schools today.

In the early 1980s, the government focused all efforts on getting children into schools and progress was primarily monitored by tracking enrolment figures. Teachers and schools were held accountable for enrolment and retaining students in school, which meant that the system ignored student learning (Ramachandran et al. 2005). Furthermore, due to the sharp rise in schools to cater to increased enrolment, the government faced a massive demand for teachers and a simultaneous shortage in the supply of high-quality teacher candidates. During this time, instituting and demanding high professional standards was challenging. Instead, teachers' qualification requirements often had to be lowered, resulting in an influx of unqualified and uninterested candidates. This lowering of standards also stewarded a rise in unprofessional behaviours—such as high rates of absenteeism, unprofessional conduct, and a lack of preparation for lessons (Beteille et al. 2020; Ramachandran et al. 2005). These norms have persisted over time and have undermined the status of teachers in Indian society.

In the remainder of this chapter, we present the available evidence on teacher knowledge, attitudes, and practices across seven different states in India: Andhra Pradesh, Bihar, Jharkhand, Madhya Pradesh, Tamil Nadu, Rajasthan, and Uttar Pradesh. These states vary in their educational performance and infrastructure and jointly provide a patchwork picture of India's teachers. We try to highlight common themes while clearly identifying the specific context of the evidence presented.

4.2.1 Teacher Practice and the Supporting Enabling Environment

4.2.1.a The State of Teacher Practice in India

Like many other LMICs, **teachers in Indian classrooms lose instructional time due to high absenteeism or non-presence in the classroom.** Multiple studies reveal high teacher absence across classrooms in the country, with variation across states. The average absence across rural schools from a nationally representative survey in 2010 was 24 per cent (Muralidharan et al. 2016). A more recent study from 2014 in Tamil Nadu and Madhya Pradesh revealed about 10 per cent teacher absence from the classroom (Kothari et al. 2016).

Many Indian teachers use traditional, non-student centric teaching methods in the classroom. A study from 2014 in Bihar revealed that teachers largely resorted to passive teaching methods such as reading from the textbook (89 per cent), asking students questions from the textbook (67 per cent), or asking students to recite material (49 per cent). Teachers rarely used any material other than textbooks, and students mostly worked individually (Sinha et al. 2016). Similarly, in Madhya Pradesh and Tamil Nadu, on average, teachers used passive teaching methods for 76 per cent of the time spent on instruction in mathematics (Kothari et al. 2016). Government schools across Andhra Pradesh were similar with only 36 per cent of teachers correcting student homework, a critical step for providing regular feedback to enhance student learning (Singh and Sarkar 2015).

4.2.1.b Reasons for Poor Teacher Practice

Students lose instructional time due to unscheduled school closures (for local festivals, events, or weather-related reasons), unauthorised teacher absences, or teachers getting roped into administrative work or official duties. High rates of teacher post vacancies further contribute to the loss of instructional time and propagate poor-quality instruction. Across government schools, many teacher posts lie vacant as these schools are unable to recruit qualified candidates based on NCTE's mandates. In India, 17 per cent of government teaching posts are currently vacant. Some states have incredibly high rates—40 per cent vacancies in Jharkhand, 40 per cent in Bihar, 29 per cent in Uttar Pradesh, 24 per cent in Uttarakhand, and 22 per cent in Chhattisgarh (Times of India 20 Sep. 2020).

Multigrade teaching and high pupil-to-teacher ratios (PTR) persist in many classrooms and contribute to poor teaching practice. Teacher vacancies, teacher absence, and misallocation of teachers across schools all contribute to multigrade teaching and high PTR. When teacher posts are vacant, multiple classrooms get clubbed together (including across grades), leading to large, heterogeneous classrooms. Teacher absence leads to similar issues as schools often deal with an absence by clubbing classrooms rather than arranging substitute teachers (Beteille et al. 2020). Lastly, teacher misallocation across regions further contributes to suboptimal PTRs. For example, the overall PTR in Jharkhand government schools is 25, which is better than the recommended central guidelines of 30. Despite this, 50 per cent of primary schools in Jharkhand have a PTR higher than 30, suggesting an uneven distribution of teachers across the state (Johnson and Chattopadhyay 2020). Regardless of the reason, teachers in these large classrooms find it challenging to manage their students, customise teaching to students' knowledge levels, or make lessons interactive.

Teacher practice is, in part, a product of their pedagogical knowledge and training, which falls short of preparing teachers adequately. Pre-service training does not equip many teachers to manage the challenges of Indian classrooms today. For example, the National Curriculum Framework recommends equipping teachers to handle multigrade classrooms, which are widely prevalent in many states; however, studies from Bihar, Madhya Pradesh, and Uttar Pradesh show that teachers struggle in these settings[22] (Ramachandran et al. 2018). Similarly, teachers are not trained to handle the diversity in learning levels in their classroom. They struggle to apply theoretical concepts regarding good pedagogical practices and, they receive insufficient practice in a classroom-like setting before becoming teachers.

Teachers face incentives that affect their practices in an undesirable way. For instance, teachers

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22. The widespread expansion in education access meant that the government opened many new schools to cater to students, including small schools with fewer than 150 students. Some very small schools have fewer than 30 students. This produced fresh challenges such as insufficient subject-specialist teachers in small secondary schools, and an increase in the need for multi-grade teaching (Anderson and Lightfoot 2019)

across the country are held accountable for syllabus completion instead of student learning. Yet, the official school curricula are too ambitious given students' initial skills in the classrooms (Pritchett and Beatty 2012). Teachers not only have to teach students material that's too hard for them, but they often need to move fast to complete the syllabus. This pace leaves little room for innovative or active teaching practices and instead further incentivises passive teaching methods.

Teachers could also benefit from consistent feedback and support to improve their practice. However, the inspection, feedback, and support systems in most government schools are dysfunctional (Ramachandran et al. 2018). The Block Resource Centers (BRC) and Cluster Resource Centers (CRC) were created to provide academic support to teachers. However, teachers' feedback, anecdotal evidence, and case studies reveal that this support is unsatisfactory and primarily administrative (Aiyar and Bhattacharya 2016). BRC and CRC officials invest in collecting monitoring data related to the school and classroom but do not provide mentorship or academic support to teachers based on this monitoring.

4.2.2 Teacher Knowledge and the Supporting Enabling Environment

4.2.2.a The State of Teacher Knowledge in India

Studies conducted in different states and expert opinions informed from decades in the sector reveal some discouraging teacher knowledge trends in Indian government schools. **While there is room for improvement in subject content knowledge among primary school teachers, teacher pedagogical knowledge is the more significant concern.**

A study in Bihar, conducted across four districts in 2014, revealed that a significant minority of primary school teachers had inadequate subject content knowledge in math and Hindi. For instance, 25 per cent of math teachers could not accurately answer questions about the content they are expected to teach, and similarly, the Hindi teachers had weak knowledge in grammar and spelling. Even when familiar with the subject content, teachers were consistently weak in transferring knowledge to students or "teaching" the content. The same study in Bihar revealed that almost 80 per cent of teachers knew the correct answer to a long division problem. However, of those who correctly answered the question, only 10 per cent could clearly explain how to solve the problem (Sinha et al. 2016).

Further, evidence from Bihar, Tamil Nadu and Madhya Pradesh reveals that teachers are often unable to assess student work accurately, a critical skill to identify areas of weak student understanding and adapt teaching accordingly. In Bihar, teachers frequently overestimated the abilities of students in their classrooms. Eighty-six per cent of teachers strongly agreed with the statement, "most children in my grade 4 class know subtraction" (Sinha et al. 2016). In contrast, student performance in independent assessments (ASER 2013) suggested that only 41 per cent of students in the state were capable of doing simple subtraction. This trend was also present in Madhya Pradesh and Tamil Nadu (Kothari et al. 2016), where most teachers struggled to identify and correct student errors. Language teachers were able to identify student errors only 50 per cent of the time, and math teachers did so only 40 per cent of the time. Teachers in higher grades found assessing mistakes a greater challenge than primary school teachers.

The evidence presented in this section comes primarily from Bihar, a particularly poor performer, with high rates of unqualified teachers. Indeed, about half the teachers that participated in this study did not have professional qualifications for teaching, and nearly

two-thirds had not attended even one in-service training in the past year. We expect the qualifications of hired teachers to be better in many other states, albeit with wide variation across states. However, expert testimony and poor student performance (ASER 2018) suggest that similar trends prevail in many other states. Additionally, low subject content knowledge is expected to be a larger concern amongst secondary school teachers since the content taught in these grades requires mastery of increasingly complex concepts. While the severity of the issue likely varies, there is scope for improvement across the board.

4.2.2.b Reasons for Poor Teacher Knowledge in India

As discussed in chapter 2, government policies and external programs can improve teacher knowledge by investing in teacher training at two critical junctures - pre-service teacher education and in-service teacher training. **There are significant challenges with both these levers in India.**

While national policy guidelines establish stringent requirements for teacher quality, the education system is unable to produce teachers that meet those requirements. The existing network of teacher training institutes in India—both pre-service and in-service—do not share the characteristics of similar institutes in high-performing nations (*Table 4 and 5*). Further, the government's weak regulation allows the sub-standard status quo to persist despite not preparing teachers sufficiently.

4.2.2.b.i Challenges with Pre-service Training

Existing training programs in India are inadequate and largely theoretical, with little practical preparation for teachers (Verma Commission 2012; MHRD 2020). Pre-service training is currently delivered by mostly fly-by-night institutions, able to survive under the radar due to inadequate monitoring systems. Entry into these institutes is easy, and prospective teacher candidates learn little. As a whole, these institutions are producing graduates unable to pass the national certification exams, possibly due to insufficient training time and inappropriate training curricula.

Table 4 depicts the status of pre-service training in India compared to the characteristics of such institutes in high-performing nations.

Pre-service training in India is primarily provided by private institutes of substandard quality. While government training centres (DIETS) offer various diplomas for teachers, most degrees are provided by private institutions—an estimated 92 per cent of teacher training institutes are privately run (MHRD 2019 as cited in Anderson and Lightfoot 2019). Many of these private institutes function as 'commercial shops' that do not meet the minimum curricular and quality requirements (Ramachandran et al. 2018; MHRD 2019). Some even offer distance learning options wherein a candidate can receive a teaching degree without even setting foot in a classroom. The National Education Policy (NEP) 2020 mandates that these substandard institutes must be shut down as soon as possible; however, for the moment, they continue operating.

Lenient enrolment and advancement requirements by pre-service institutions produce a large supply of candidates who have teaching degrees but are unqualified to be teachers. Enrolment into institutes is easy, without any stringent entry requirements. Assessments exist to determine advancement, however, they primarily evaluate trainees' knowledge, and their conceptual and pedagogic skills are not adequately assessed (MHRD 2012 as cited in Beteille

Table 4: Comparison between pre-service institutes in India and high-performing nations

CHARACTERISTICS OF PRE-SERVICE TRAINING IN HIGH-PERFORMING NATIONS (CHAPTER 2)		STATUS IN INDIA
Trainings provided by high-quality and well-regulated institutes	• Pre-service institutes are closely regulated • Degrees are typically 4 years	• Largely private institutes providing substandard training, and persisting due to weak regulations • Degrees are 9 months - 2 years
Strict entry and advancement	• Institutes have strict selection and advancement criteria which are transparently enforced. This helps filter out less effective or unmotivated candidates.	• Entry and advancement are easy, producing ill-prepared candidates with degrees but no skills. These graduates fail the government mandated test for becoming teachers at high rates.
Linkage to the broader education system	• Pre-service institutes have close links with universities and schools. This ensures curriculum alignment, adherence to the latest education research, and allows opportunities for teachers to practice in real classrooms.	• No linkage between pre-service institutes and universities and very weak linkages with schools. Hence, curriculums offered by institutes are outdated and teachers receive little real-world training.
Practical component in trainings	• Extensive practical component (~ 6 months) where teachers can practice what they have learned to develop effective practice	• Overly theoretical, with little or no practical training. Teachers receive at most 6 weeks of practical training.

et al. 2020). This results in a larger number of potential teacher candidates compared to the needs of the system. Despite this large number of candidates, vacancies abound because the graduates from these institutes cannot pass the government-mandated exams to become teachers despite its unambitious cut-off.[23] In 2018, only 17 per cent out of 1.7 million teacher candidates who had completed pre-service education crossed the cut-off at the primary level, and 15 per cent crossed the cut-off at the upper primary and middle-grade level (Times of India Jan 5. 2019). Candidates who don't pass the TET often end up as contract teachers, who are paid less than permanent teachers due to insufficient credentials but continue teaching students across government schools.[24]

The low pass rates may partly be a result of problems inherent in the TET test design or implementation rather than solely based on a genuine lack of the required skills and knowledge among candidates (Ramachandran et al. 2018). Therefore, the TET may not be measuring the right knowledge and skills for effective teaching. If so, the poorly designed test coupled with an extremely low pass rate points to a training infrastructure that at best, produces teachers whose preparation level is unknown.

23. According to data shared by the Union Education Minister in response to a written query at the Lok Sabha parliamentary meeting, 17.1 per cent of teaching posts in government schools were vacant in September 2020. Sikkim, Jharkhand, Bihar, and Uttar Pradesh are the states with highest vacancies (Times of India Sep 20. 2020)

24. For example, in early 2019, one-third of the teachers in Delhi were contractual teachers ,of which 77 per cent were unable to pass the teacher recruitment test (India Today Mar 2. 2019). Most other states face a similar state of affairs.

Training institutes do not have close ties to schools, universities, or the education administration, as is seen in high-performing countries. This lack of connection leads to an unalignment between the curricula taught in pre-service institutes compared to the curricula in schools. Teachers are hence inadequately prepared to teach the curriculum they are expected to cover in classrooms. Additionally, the limited collaboration with universities means that pre-service institutes and their students do not benefit from the latest education research. Finally, these institutes are not connected to data collected during in-service trainings and so are not informed by teachers' needs and challenges they face in classrooms (MHRD 2012 as cited in Beteille et al. 2020).

Lastly, the education degree programs are primarily theoretical, with limited opportunities for teachers to practice what they learn. The teaching that does happen, over-emphasises theory, uses lecture-based passive teaching methods, and provides little to no opportunity for teachers to practice skills in a classroom-like setting. The lack of collaboration between pre-service institutes and schools and universities further limits teachers' opportunities to practice skills in classrooms. There is also a dearth of well-prepared teacher-trainers, with no clear standards for the qualifications and professional development of trainers in most institutes (Beteille et al. 2020)

Why do such poor quality institutes continue to proliferate? A primary reason is the lack of systematic monitoring and regulation of institute quality. The National Council of Teacher Education (NCTE) is responsible for accrediting teacher education institutions, phasing out sub-standard institutions, and providing guidance regarding curricula and methods. In practice, the regulatory oversight provided by NCTE is low and extremely weak for a few reasons:[25]

- The NCTE relies on self-reported data from these institutions for monitoring quality. Many institutions do not share the requisite information for regular monitoring and face no repercussions for their failure to do so.
- Without vetting processes to corroborate data that is received from institutes, data quality suffers. The self-reported data that are shared are biased and of poor quality, and often manipulated or fraudulent.
- There exist no regular, independent assessments of institution quality to track quality after the initial assessment.

There is a clear need to reform the accreditation and management processes; however, attempts to improve the NCTE have been mired in politics and stalled due to vested interests of various teacher institutes (Swarup 2019).

4.2.2.b.ii Challenges with In-service Teacher Trainings

Chapter 2 discussed some of the qualities of strong in-service teacher training programs to keep teachers prepared and up to speed with the latest research and evolving curricula. In India, in-service trainings rarely, if at all, possess any of the qualities deemed as critical for maintaining teacher skills (*Table 5*) (Beteille et al. 2020; Anderson and Lightfoot 2019).

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25. Based on stakeholder interviews with experts familiar with the functioning of NCTE

Table 5: Comparison between in-service teacher training in India and high-performing nations

COMPONENTS OF STRONG IN-SERVICE TRAINING PROGRAMS (CHAPTER 2)		STATUS IN INDIA
Curriculum and content	• Trainings focus on subject-specific pedagogy rather than general pedagogy, and target content to specific teacher needs. • Trainings are closely aligned with the school's curriculum and integrated with the day-to-day schedule of teachers.	• No systematic data available on content covered in teacher trainings. The few assessments that do exist show that: • Trainings are largely administrative/process based in nature • Trainings are unlinked to teacher needs
Pedagogy	• Trainings are practical in nature and include lesson modelling, active teaching, and provide supplementary material that supports training content. • Frequent follow-ups are conducted to observe teacher practice and provide feedback	• Trainings have passive teaching with limited modelling • Supplementary material is seemingly provided • Limited follow-ups are conducted and feedback on teacher practice is rarely provided
Time available for instruction	• Regular and ongoing trainings with consistent follow-ups	• One-time trainings implemented in an ad-hoc manner • Many teachers don't even get trained once in a year
Effectiveness of trainers	• Well-prepared trainers with a strong background in education and relevant local knowledge	• Quality of trainers is largely unknown. A handful of studies reveal insufficient qualifications for teacher-trainers.
Receptiveness of teachers	• Teachers are motivated to participate in trainings, often by tying training attendance and engagement to extrinsic incentives such as career advancement opportunities	• No incentives are provided to motivate teacher participation • Teachers often don't value trainings

Implementation of in-service training in India is weak. Poor execution of policy prescriptions, poor regulation of training incidence and quality, and the formidable challenge of training a substantial teacher workforce all contribute to this.

The National Education Policy in India provisions significant in-service training for teachers (at least 20 days every year), and identifies the types of institutes that can provide in-service training. However, it leaves the details regarding content and delivery up to individual states. Hence, training quality varies considerably across different states (NCERT 2016 as cited in Beteille et al. 2020; Ramachandran et al. 2005). In general, most states do not have effective policies to govern content quality, track delivery, and monitor implementation of in-service training (Beteille et al. 2020; Ramachandran et al. 2005).

There are few evaluations of training programs in India, leading to scant empirical evidence on their quality. However, the empirical evidence that does exist and expert testimony suggests scope for improvement. For instance, a meta-analysis of evidence on 10 in-service trainings in Bihar revealed that they lagged behind on many characteristics associated with top-performing professional development programs—such as practical components, follow-ups, and linking training to salary (Popova et at. 2018). Additionally, given the large teacher workforce in many parts of the country, many states rely on cascade training models, which further dilutes the quality of training that they deliver.

Most states do not systematically track the content delivered in a training or the number of trainings conducted. A database tracking this information can be a useful input into training design but does not exist in most states (Beteille et al. 2020; Ramachandran et al. 2018). Trainings are frequently conducted without assessing teacher needs and, rely heavily on traditional, passive teaching methods with limited opportunities for teachers to practice what they learn (NCERT 2016 as cited in Beteille et al. 2020; Popova et al. 2018; Kumar 2017). Furthermore, trainings are unlinked to teacher career paths or other incentives that can encourage genuine participation.

Delivery and incidence of in-service training is also sporadic, with almost no state achieving the 20 days a year benchmark prescribed by national policy (Anderson and Lightfoot 2019). This inconsistency is in part due to the financing structure for in-service trainings. They are mostly funded by two centrally sponsored schemes (SSA and RMSA) and hence are subject to the availability of funds and any other priorities under these schemes. In 2014, only 31 per cent of teachers in government schools had received in-service training in the previous academic year (UDISE 2013-14).

Research from Uttarakhand, Tamil Nadu, and Maharashtra found that many teachers skip mandatory training for reasons such as logistical difficulties, a lack of interest, or scepticism about the value of the training (Anderson and Lightfoot 2019). Moreover, teachers receive training during school working days, and schools often do not make provisions for substitute teachers. In such cases, not only do students lose out by not having their regular teacher available to teach them, but they also lose out because mostly this training does not improve teachers' ability to teach (Singh and Sarkar 2015; Beteille et al. 2020).

4.2.3 Teacher Attitudes and the Supporting Enabling Environment

4.2.3.a The State of Teacher Attitudes in India

Evidence on low teacher attendance, low self-reported motivation, and the success of interventions targeting motivation suggests considerable room for improvement in teacher effort and attitudes in India.

The high rates of teacher absenteeism in many states,[26] particularly in rural India, are widely considered a manifestation of poor teacher motivation and a lack of incentive to exert effort.[27] Indeed, the few existing studies on this topic from Rajasthan, Bihar, and Uttar Pradesh suggest

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26. A High rates of teacher absenteeism persist across India. A nationally representative panel of 3000 rural public primary schools across 19 states revealed an average absenteeism rate of 23.6 per cent in 2010. In general teacher absence varies significantly across states (Jharkhand is high and southern states are lower) (Muralidharan et al. 2016)

27. Across articles, texts, academic papers, and opinion pieces on Indian teachers, a common refrain is that teachers in Indian government schools lack motivation toward their jobs. Similarly, many experts we spoke with also reiterated this 'motivation problem.'

low-levels of self-reported motivation among teachers and poor attitudes about their jobs (Ramachandran et al. 2005; Kingdon and Banerji 2009; IDinsight 2017).

Additionally, the success of interventions that provided performance incentives to teachers shows room for improved teacher effort. In Andhra Pradesh, a program providing bonus pay to teachers based on average improvements in student test scores resulted in gains in math and language learning outcomes (Muralidharan and Sundaraman 2011). In Udaipur, a study revealed that monitoring teacher attendance and tying it to teacher salaries resulted in a 21 percentage points drop in teacher absence (relative to a control group) and a corresponding improvement in student test scores (Duflo et al. 2012). These studies further bolster what many experts in India believe—there is a 'slack' in teacher effort and motivation in India, with room for increasing both with appropriate incentives. In general, teachers in India operate in a low-accountability environment that does not tie career progressions and salaries to performance, providing little incentive for teachers to perform.

4.2.3.b Reasons for Poor Teacher Attitudes in India

The Indian education system is riddled with risk factors contributing to a demotivated teacher workforce. Comparing the existing systems in India with global education systems that sustain positive teacher attitudes reveals multiple gaps (*Table 6*).

Table 6: Comparison between best practices for positive teacher attitudes and the status in India

BEST PRACTICES AS PER GLOBAL EVIDENCE (DISCUSSED IN CHAPTER 2)		STATUS IN INDIA
Long Term: Hiring and working conditions	• Hiring the right candidates and ensuring appropriate working conditions that are transparently enforced.	• Teachers often face poor working conditions including high (perceived) administrative burden, opaque regulations, and unclear rules.
Short Term: Accountability systems	• Holding teachers accountable to performance and tying salaries and career progression to outcomes like improved student learning or teacher attendance.	• Extremely low accountability to perform well on important outcomes like student learning. Teacher performance is not tracked effectively and is rarely tied to any incentives.
Short Term: Support systems	• Providing support—such as training, individualized attention and coaching, recognition— to make teachers feel valued and improve their motivation.	• Teacher receive insufficient support, which is untied to actual needs. A governance infrastructure to support teachers exists, but the officials responsible for providing this are not effectively trained for the role.

Working Conditions: Teachers in many government schools face poor working conditions or, at the very least, perceive their working environment to be poor (Singh and Sarkar 2015; Beteille et al. 2020). They are frequently roped into administrative work and duties outside of their teaching responsibilities and in general, perceive high levels of administrative overload. This takes time away from teacher-student interactions, affects their job satisfaction and, more

broadly, diminishes the status of teaching as a profession. High-teacher absenteeism (which persists across the country) further increases unplanned multigrade teaching, putting more pressure on the teachers present and reducing teaching stability.

Teachers also face an opaque administrative structure with unclear rules, regulations, and policies, which further contributes to low motivation to perform on the job (Sinha et al. 2016). For instance, teacher transfers are hard to predict and often politically motivated, providing little to no room for teachers to plan their careers and personal lives.

Support: teachers receive insufficient support, often untied to their actual needs. For instance, as discussed in the previous section, many teachers either don't receive in-service training or receive inadequate training. Most teachers do not have access to resources and peer communities of practice to foster an intellectual working environment. Government officials who are expected to provide academic support to teachers are ill-equipped to do so. They perceive their role as compliance officers who collect records and perform administrative tasks rather than building a support system for teachers (Aiyar and Bhattacharya 2016; Ramachandran et al. 2005).

Accountability: Teachers have no incentives to perform as they are not held accountable for student performance. Systems for teacher evaluation are ineffectual and rarely used to tie real consequences to teacher performance. Promotions are based on seniority, and rewards are often political and untied to performance (Beteille et al. 2020; Kingdon and Banerji 2009; Ramachandran et al. 2018). While policies for teacher performance appraisals exist on paper, their implementation is weak and often subjective (Ramachandran et al. 2018; Sinha et al. 2016). Without robust, transparent performance appraisal, rewards and professional development cannot be calibrated to a teacher's actual performance.

This lack of accountability also affects teacher perceptions of their role. For example, teachers often do not hold themselves responsible for improving student learning. A study in Bihar showed that 60 per cent of teachers considered parents as ultimately responsible for student performance and believed that students who weren't learning required additional private tuitions (Sinha et al. 2016).

In many ways, the story of teacher motivation in India is like the story of teacher motivation in other LMICs. There are, however, some key differences. Teacher salaries in India's government schools are much higher relative to the average national income than in other countries and have risen tremendously over the past few decades. Government school teachers are paid three times their counterparts in China and 25 times what private schools in the country remunerate teachers (World Bank 2016). Teachers are also generally paid on time and have strong job security once hired. Surveys of full-time public-school teachers show that teachers are satisfied with the present salary levels (Ramachandran et al. 2018). Even if teacher salaries could be a lever to improve motivation—which evidence from Indonesia shows is ineffective without accountability structures (De Ree et al. 2018)—there doesn't appear to be much room to move on the salary front in the Indian context.

4.3 Building a Better Teacher Workforce in India

The Indian government spends a large part of its education budget on teacher salaries. A recent analysis of budgets of six states revealed that their education departments spent 78 per cent of the budget on teacher salaries in 2017-18[28] (Bordolai et al. 2020). According to another

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28. Education budgets of the following states were analysed: Bihar, Himachal Pradesh, Odisha, Rajasthan, Tamil Nadu, West Bengal

estimate, the fiscal cost of teacher absence is over $1.5 billion per year, which was 60 per cent of the revenue collected in 2010 from the special education tax used to fund SSA (Muralidharan et al. 2016). Given these high levels of expenditure on teachers and the high cost of a poorly performing teaching workforce, improving teachers' return on investment should be a priority across Indian states.

While the evidence base on India's teachers is thin and confined to certain states, it does highlight some common focus areas where national and state-level efforts can result in improvements. In the remainder of this section, we present some recommendations for building a better teacher workforce in India.

4.3.1 Prepare Teachers Better

Intervention at the pre-service teacher education level can improve the pipeline of teachers from which government schools hire. In India, there is need to:

- **Create a database to manage pre-service institutions:** The pre-service landscape in India is a black box with limited information on different education providers. There is a pressing need to gather data on the quality of existing institutes, and to curate an up-to-date database on all institutes. This database would ideally be built and managed by NCTE and should capture, at the very least, whether registered institutes physically exist, whether they are functioning, what syllabus they teach and how it connects to the prescribed NCTE curriculum, profiles of educators, student graduation rates, and TET pass rates of graduates. This database, once built, can serve as the foundation for monitoring and managing institute quality.

- **Improve institute regulation:** NCTE should conduct independent assessments to complement self-reported data shared by pre-service institutes. Independent assessments can provide an unbiased appraisal of quality and also inject accountability into the system. Further, NCTE should make accreditation continuous by requiring re-accreditation every 3-5 years, thereby ensuring that institutes fulfil a minimum bar of acceptable quality. Accreditation is currently a one-time exercise. Institutes accredited over a decade ago continue to operate, even though many are radically different today. Re-accreditation must instead be based on outcomes, such as minimum student pass rates on the TET, with appropriate guards against data manipulation.

  A more transparent assessment of the quality of different institutes, which is readily available to the public (see point 1) can have the added benefit of re-activating the market for teacher training and induce pressure on private institutes to maintain high-quality. Aspiring candidates can choose to attend higher-quality institutes, putting upward pressure on institutes to invest in improved quality.

- **Reform the curriculum offered by institutes:** The curriculum offered by institutes could be standardised and vetted by education ministries to ensure it's in line with the skills teachers require once they enter a classroom. Additionally, skill deficits identified through various assessments, such as the TET or evaluations conducted as part of in-service training, should inform pre-service institutes' curriculum design. Institutes should be required to update their curriculum frequently and maintain close links with universities to incorporate the latest research. Similarly, they should be closely linked with NCERT and state education departments to better accommodate the curriculum taught in primary and secondary schools across the country.

- **Implement practice-based teaching:** Pre-service training in India is overly theoretical and does not prepare teachers to apply good pedagogical practices. This contrasts with high-performing countries where teachers receive significant practical training. For instance, pre-service training in Shanghai, South Korea, and Finland all require teacher candidates to undergo at least six months of classroom teaching as part of the curriculum. Teacher Education Institutes in India should emulate this practice, requiring teacher candidates to spend significant time practising what they learn in classroom-like settings.

- **Strengthen the Teacher Eligibility Test (TET) and recruitment process:** A well designed TET can help assess if pre-service institutions are sufficiently prepared teacher candidates. TETs must test teachers on relevant content, including subject-specific assessments added for subject-teachers, particularly in secondary schools. Additionally, while the TET can be leveraged to assess teacher content knowledge, teacher practice and attitudes are harder to assess via an exam. To assess attitudes and practices, a teaching demonstration and teacher interviews can be leveraged. Building such robust recruitment tools can help filter out poor quality candidates coming out from substandard pre-service institutions.

The recently released National Education Policy (NEP 2020) makes some encouraging policy prescriptions for improving pre-service institutes' quality. It calls for better regulation of institutes and the weeding out of sub-standard institutes as soon as possible. It also calls for a four-year degree program (current programs are 2-year long), with a significant focus on in-classroom and practical training for teachers (MHRD 2020). We hope that the elevation of these issues in the NEP will help mobilise the necessary momentum and resources required to execute on the ideas.

4.3.2 Ensure Teachers Receive High-Quality Professional Development Once Hired

In-service training offers a way for states to improve the quality of the stock of teachers already in the system, particularly those that received inadequate pre-service training. Tackling the gaps in teacher knowledge and skills at the in-service level is also likely to receive less political pushback than efforts to transform the entrenched pre-service systems. As such, this is likely the most feasible tool available to education departments in various states in the short-run, particularly since states have a lot more control over the curriculum for in-service training. States can improve the quality of in-service training in several ways:

- **Orient training to address classroom realities, such as student heterogeneity:** Training curricula should be reformed to prepare teachers to address the unique challenges they face in government classrooms. For instance, training should prepare teachers to deal with classrooms composed of students with diverse learning levels, classrooms with students behind grade-level, and classrooms with high Pupil to Teacher Ratios (PTR). Teachers should also learn to tackle multigrade teaching, which is still widely prevalent in many schools across the country (Kingdon and Banerji 2009). Existing resources used by proven programs such as "Teaching at the Right Level" interventions should be leveraged to prepare teachers to deal with diverse learning levels effectively.

- **Focus on subject-specific pedagogy:** Given the lack of empirical data on various in-service training programs, it is hard to identify the content they cover. Small studies reveal that

these trainings are mostly process-oriented with little time reserved for academic topics. To improve effectiveness, the ratio of topics taught should be reversed, with more time spent on academic content. In covering academic topics, the focus should be on subject-specific pedagogy and not general theory. Additionally, trainings should incorporate practice-based sessions, as discussed in the previous section on pre-service training.

- **Target training better:** Training can be better targeted if informed by teacher performance and needs. This can be done by a) using teacher performance appraisals to determine areas where teachers are underperforming and b) sourcing feedback from teachers themselves. While many states conduct teacher needs assessments, there is limited evidence that these are used to inform training design.

  To target teachers better, it is critical to account for teacher experiences and qualifications. Novice teachers' needs differ from those of seasoned veterans, and these cohorts should train separately to adequately address their professional development requirements.

  Designing trainings to accommodate diverse teacher needs within the budgetary and time constraints faced by states is challenging. Training can be cheaply delivered while accommodating diverse needs by decentralising to block or cluster levels, offering opt-in courses on various topics during the same training, exploring individually customisable digital training (coupled with incentives to encourage completion). Each of these suggestions requires iterative piloting to develop a model that works. The National Initiative for Schools Heads Teachers' Advancement (NISHTHA) platform launched by the Department of School Education and Literacy under the Samagra Shiksha Abhiyan in 2019-20 to build competencies among school teachers and principals was a step in the right direction. However, expert interviews reveal that the NISHTHA platform is driven at the national level and is not customised to teachers' needs within and across states, which deters usage. Regardless of the final modality that states adopt, more decentralised design and implementation will likely lead to better targeting.

- **Link in-service training to incentives:** By linking in-service training, or specifically the knowledge and skills acquired, to salary or career advancement opportunities, teachers can be incentivised to genuinely participate in the training and try out learnings in their classrooms.

- **Monitor implementation quality and evaluate impact:** Almost no state in India has a policy for assessing the quality of existing in-service programs. Without tracking implementation fidelity, recording inputs (such as the number of trainings and topics covered), and evaluating the impact of trainings on teacher knowledge and practices, it is impossible to know if existing programs are working.

  State governments can leverage existing tools for assessing quality, such as the World Bank's In-Service Teacher Training Survey instrument, which can benchmark their programs against international best practices. To understand the impact of in-service programs, teacher practices and knowledge must be assessed periodically and the results of such assessments must be used to inform future trainings.

4.3.3 Provide Continuous Feedback and Support to Teachers

Global evidence reveals that continuous feedback via regular follow-ups and ongoing coaching is important for teacher professional development. Currently, in-service trainings in India are one-time events with limited follow-up, which dilutes effectiveness. States can leverage existing systems to offer follow-up support to teachers to help them implement what they learn. For instance, they can leverage the existing cadre of Block Education Officers (BEO) and Cluster Resource Coordinators (CRC) to provide follow-up support connected to in-service training. This requires incorporating regular academic support to teachers in these officials' day-to-day responsibilities and holding them accountable for it. Officials must be trained to coach and provide feedback to teachers effectively. As an example, in 2012-2013, the NGO Pratham and certain academics tried to scale the TaRL interventions in government schools across Haryana by training government CRC officials to provide academic support to teachers. These CRC officials were then responsible for providing ongoing support to elementary school teachers in implementing TaRL, ultimately resulting in improvements in student learning (Banerjee et al. 2016). With concerted action, a similar program can be expanded across different states.

Alternatively, more experienced teachers could be trained as mentors for younger, less experienced teachers, offering ongoing support and following up to help implement content learned in training. For example, the Delhi Government launched a new curriculum in 2019—The Entrepreneurial Mindsets Curriculum—where they trained mentor teachers (mid-career teachers who were typically more motivated and confident) and leveraged them to observe classrooms, provide feedback and generally support teachers.

4.3.4 Establish Transparent Systems to Hold Teachers Accountable for Performance

Across states, teachers quite literally have no incentive to perform. Without appropriate accountability structures, additional investments in inputs, such as teacher training, are an ineffective use of public funds, resulting in limited improvements in student outcomes. On the flip side, evidence shows how contract teachers who face accountability pressures in the form of annually renewable contracts have lower absence rates (Kingdon and Banerji 2009) and higher student outcomes (Muralidharan and Sundaraman 2013). To motivate performance and effort, states need to establish clear, transparent accountability structures for teachers and other stakeholders. Some ways to achieve this, include:

• **Assess teacher performance and monitor it regularly:** A first step toward achieving increased accountability is effectively measuring teacher performance. Currently, while policies for formal teacher reviews exist, implementation of these policies is weak or non-existent (Ramachandran et al. 2018). A clear and transparent performance appraisal system should be instituted, incorporating multiple sources of information such as student learning outcomes, classroom observations, supervisor and peer testimonials, and self-assessments (Kane and Staiger 2012).

Ongoing monitoring and support for teachers can also be improved by better leveraging the existing school governance infrastructure—the Block Resource Centers (BRC) and Cluster Resource Centers (CRC). To do so, states need to fill BRC and CRC vacancies, train officials to monitor teachers, and train them to support teachers based on the monitoring. All these duties already exist on these officials' job descriptions, but in practice, they play

an administrative and compliance-oriented role. One study estimates that the marginal returns of an inefficiency-reduction strategy such as investment in the school governance infrastructure are significantly higher than an input-augmentation strategy, such as hiring more teachers (Muralidharan et al. 2016).

- **Tie teacher performance to career advancement and establish a transparent pathway for career growth:** Promotions in India are unlinked to performance and do not establish the right incentives for effective teaching. States must reward performance rather than seniority to build the right incentives. States can use performance appraisals to promote teachers. Pritchett and Murgai (2008) recommend establishing a professional development ladder, which clearly highlights promotion and pay-rise opportunities and associated requirements during a teacher's career. They recommend starting new teachers on annually renewable contracts for a specified probationary period, beyond which permanent posts are offered based on performance.

  In practice, implementing performance-based career promotions is politically fraught due to strong teacher unions in India. Any change in this system will require strong political commitment, consensus building across political groups, and careful management of teacher unions. Karnataka was able to implement a transparent technology-enabled teacher recruitment process precisely due to political will and effective management of opposition leaders and bureaucrats (Beteille et al. 2020). In general, new systems must be objective with transparent processes, which outline reasonable expectations from teachers and provide concrete plans to enable teachers to succeed.

- **Consider pay-for-performance incentives:** In the short-term, in lieu of large-scale overhaul of the existing teacher performance appraisal and management system, states could consider tying bonuses or other incentives to specific performance outcomes. Outcomes could be teacher attendance or student learning, which states can measure effectively. There is plenty of experimental evidence from India which shows improvements in performance with increased monitoring and linking rewards to performance (Duflo et al. 2012; Muralidharan et al. 2017)

  The recent National Education Policy 2020 highlights the importance of "robust merit-based" promotion and salary structures to incentivise and recognise outstanding teachers. It further calls for more structure around career growth and reductions in disruptive teacher transfers. This is the right policy, but implementation needs to follow.

4.3.5 Improve Other Teacher Management Processes

Many states have opaque teacher management processes often implemented in an ad-hoc manner to suit political whims. Many are also inefficient. For example, most states (with the exception of Karnataka and Tamil Nadu) do not have a formal teacher recruitment policy based on an assessment of the school-wise need for specific subject teachers, resulting in ad-hoc recruitment that doesn't meet school needs.[29] Clarifying these policies and transparently implementing them can clear up confusion, enable teachers to plan their careers, and improve job satisfaction.

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29. In many states there is a huge shortage of teachers in mathematics, science, commerce, and English as a result of which some of these subjects are not offered in many schools (Ramachandran Sep 18. 2020)

One low-touch way to increase transparency and efficiency is to improve the quality and design of existing data systems. For instance, in many cases, the same state has schools with very high and very low PTR, suggesting that teachers' reallocation is needed. However, to take this decision, government officials must have a high-level, comprehensive view of these patterns, which is often lost amid the existing, complicated data systems. Some states, like Haryana, have leveraged technology successfully to integrate existing educational management information systems (EMIS) into a single, comprehensive information system. An integrated EMIS increases efficiency, provides a holistic view of the state of affairs, and facilitates increased transparency. However, while data systems can improve efficiency and transparency on the margins, they are not substitutes for more systematic change in policies and implementation.

4.3.6 Use Data to Guide Policy

Different states operate in different contexts and invariably need customised policies. While national-level policy guidelines are critical for setting the vision and standards that schools should aspire to, ultimately, state governments must determine individual approaches based on their unique contexts. An important starting point is to develop an understanding of the teachers' current status (knowledge levels, attitudes, and practices in the classroom) in each state. Much of the evidence on teachers presented in this report is at least five years old, and there have been numerous changes and government investment in teachers since then. **New primary data to gain an updated understanding of the state of teachers in government schools today can serve as an essential first step to kickstart the design of relevant policies.**

While governments should continue relying on administrative data, regular, sample-based surveys that test student learning outcomes, teacher knowledge levels, teacher attitudes and observe teacher practices can help understand where intervention is necessary. India's enrolment into PISA in 2021 is a promising start, and education leaders should use that data to direct policy. In addition, teacher testing can also be helpful. Teacher unions may oppose testing, but if carried out sensitively and if used to identify areas where teachers require more support, these tests can be a helpful tool. Establishing new norms overtime where teachers view assessments as an opportunity to improve skills (Kingdon and Banerji 2009) can normalise the process and make the education system fully aligned to improved learning (Kingdon and Banerji 2009).

Assessments can also help identify the "bright spots" in the system (Heath, C. and Heath, D. 2011)—those teachers, schools, and officials who perform well despite existing conditions. These members can be celebrated, but more importantly, studied and their systems and approach scaled-up across schools.

Any education reform in India is a significant undertaking. The large diversity of contexts and challenges ensures that there is no single, standard solution—each state needs to figure out the details of different policies. Teachers are an important part of this reform process. The recently released National Education Policy 2020 acknowledges many of the challenges discussed in this report and lays out an ambitious vision for reform, which is encouraging. We hope this provides much-needed momentum to different stakeholders to come together and execute on this plan in a concerted manner.

Conclusion

This report presents evidence aimed at empowering policymakers in LMICs to wield the resources at their disposal for improving the knowledge levels, attitudes, and practices of teachers in their countries. While there is a lot more to learn, the existing evidence base from around the globe identifies programs and interventions that can work to improve teacher effectiveness. Box 4 below summarises the key principles and programs that can improve teacher effectiveness if designed and implemented well.

Box 4: Summary of effective programs that improve teacher performance

Teacher Practice
- Teachers must be held accountable to good practices (such as high attendance rates) by monitoring the practice and tying it to incentives or salaries.
- Many LMIC classrooms are composed of students with varying learning levels. Using a set of interventions known as Teaching at the Right Level (TaRL), teachers in primary classrooms can better target content to their students' learning levels.
- Providing teachers with detailed scripts that are adaptable enhances teacher practice. Scripts are particularly effective in contexts where teachers have lower capacity and less time to prepare for classes.
- EdTech, when leveraged appropriately and implemented well, can supplement teacher practice and improve student learning.

Teacher Knowledge
- Strengthening the pre-service training infrastructure can better prepare teacher candidates. LMICs can improve pre-service training by ensuring institutes teach the appropriate curriculum, incorporate significant practical and active training for teachers, have close ties to schools and universities, and have stringent enrolment and advancement criteria.
- Providing continuous support and in-service training to teachers throughout their careers further enhances knowledge. LMICs can design in-service training and support using global best practices identified from countries with high student performance levels.

Teacher Attitudes
- There is scope for improved teacher effort in LMICs; policymakers can consider holding teachers accountable to performance and incentivising effort by leveraging performance-based monetary incentives.
- Policymakers can target teacher motivation by providing support in the form of high-quality training, individualised attention and coaching, recognition, and a favourable work environment

Policymakers must also strengthen their enabling environment to implement and sustain the programs identified in this report successfully. Failing to consider how teachers interact with their enabling environment and how they are, in turn, influenced by this enabling environment can limit the success of a program. A robust enabling environment requires deep reform to the policies, institutions, and norms that govern an education system.

In addition to the critical principles for improving teacher effectiveness, we also have evidence on things that don't work. Investing in inputs without correspondingly altering the underlying incentives faced by different stakeholders or changing teacher-student interactions is unlikely to be successful. For instance, in Kenya, the provision of textbooks increased students' likelihood of remaining in school but did not improve learning outcomes for most students. This was primarily because the textbooks were far too complex and not easily understood by the students; hence they failed to alter classroom interactions. Evidence also shows that generic teacher trainings that focus on theory are ineffective at improving teacher knowledge. Furthermore, providing teachers information on student learning levels without supporting them to customise their teaching to these students can fail, particularly in regions where teachers have lower capacity and motivation. EdTech can work, but only when implemented well and when it doesn't entirely displace teaching in a classroom. And finally, school management committees in LMICs are generally ineffective, at least as standalone interventions, mainly due to operational issues or limited ability or authority to act.

The challenges that the programs discussed in this report are designed to solve are widespread in LMICs but exist across the world. Indeed, the underlying design principles for these programs—holding teachers accountable, incentivising performance, training teachers thoroughly and regularly, supporting teachers with new programs in classrooms, supporting school management, and building robust systems for accountability across stakeholders—are applicable globally.

In addition to the fundamental principles highlighted in this report, another natural extension of the enabling environment that policymakers must consider is the specific "context" in which teachers operate. What works in one context may fail in another, or similar programs may yield different results in differing contexts. Policymakers should be wary of directly exporting solutions from one context to another. Instead, they must strive to understand the underlying conditions required for a program's success and carefully reproduce these conditions in their context. This process of customising a program to a different context is crucial yet often overlooked. The current body of evidence can be leveraged as a starting point for policy consideration. However, before at-scale implementation, policymakers must invest more deeply in understanding the theory behind an intervention and extensively piloting and iterating to refine the program for their context.

The existing evidence base offers essential tools that policymakers can leverage in their contexts, but there remain gaps in this evidence body. Much of the evidence is short-term, with few studies (understandably) tracking long-term impacts. Also, many of the existing studies evaluate small pilot projects instead of at-scale implementation. Interventions may prove to be less effective at scale for various reasons, including political economy concerns and system-level considerations (such as state agents' capacity). For example, an impact evaluation of a contract teacher program in Kenya showed limited success at scale, despite strong results in the pilot due to bureaucratic opposition to the reform, which emerged when implemented at-scale (Bold et al. 2013). Lastly, much of this evidence is thin on cost-effectiveness data which is essential for policymakers to compare across different options in order to optimise their budgets. Future research can contribute tremendously by filling in these gaps in the evidence.

The evidence-base on teacher effectiveness paints a coherent path for policymakers and provides multiple feasible options. Leveraging this evidence to curate contextual policies and programs can greatly enhance the quality of teachers across LMICs.

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