Reforming the Indian School Education System

Karthik Muralidharan[1]

A fundamental source of tension in the design of an education system comes from the fact that, historically, education systems have served two very different purposes.

First, they have sought to impart knowledge, skills, and shared concepts of identity and citizenship. We can broadly refer to these as the "human development" role of education.

However, education systems have also served a second purpose, which is to assess and classify students on the basis of educational ability and achievement and to select higher achieving students for higher education and occupations that aim to attract the most meritorious students. We can refer to this as the "sorting" function of education.

A quick summary of Indian education history after independence would suggest that the majority of the education system is driven by "sorting" rather than "human development". Indeed, the Indian education system in its current form is perhaps best understood as a "filtration" system rather than an "education system".

Using this framework helps make sense of several deep structural challenges of the Indian education system that have been widely remarked upon. These include:

1) There are **massive inequalities** in the overall education system — which, on the one hand routinely produces students who go on to achieve global excellence in their fields, while on the other hand also produces the world's largest number of primary school-completing students who are not functionally literate and numerate at even a second- or third-grade level.
    a. A major reason for this is that the syllabus and textbooks have not changed from a time when a much smaller fraction of students were in the education system. Since the focus of the system continues to be on "passing" exams linked to the syllabus, children who fall behind the curriculum often end up learning close to nothing despite attending school.[2]
    b. This is because teachers, parents, and students are not rewarded for improving learning at levels below the current grade level, because it will not help in pass the grade-level exam — and so students who fall behind early are left behind in perpetuity

[1] UC San Diego, NBER, and JPAL;
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[2] As shown in Muralidharan, Singh, and Ganimian (2019)

2) An obsessive focus on exams and marks has led to an education system characterised by **rote learning** to pass exams (often through cramming of past exams) as opposed to conceptual understanding that can be applied and used in practical situations.
    a. This is also in part a consequence of point (1), because the only viable strategy for students who fall behind is to cram for exams and hope to pass them by having memorised questions that may appear on the exam
    b. Conceptual understanding is not prioritied as it is not rewarded by the exam system

3) Very **low levels of practical skills** even among students who have notionally "passed" various exams and possess various levels of paper qualifications

Note that there is nothing wrong with "sorting" per se. Every society around the world aims to identify its most talented citizens and match them into leadership roles and occupations that affect society as a whole. It is also completely rational for both institutions of higher learning and for employers to seek credible signals about the level of learning in preparation of students, and for students to seek to credibly provide the signals.[3]

Further, "sorting"-based education systems may well have been efficient for agrarian societies where the fraction of knowledge-based jobs was small and where the economic and social returns to education were limited for those in agrarian and manual labor. However, the modern knowledge-based economy requires every citizen to be educated to the point where they are empowered to build their skills and capabilities in a continuous way, and on their own initiative.

However, the problem with the "sorting" paradigm of education is that children who fall behind (overambitious) grade-level standards do not get a meaningful education because there is no provision for "teaching at the right level". This has led to a massive waste of both time and money. Money is spent on building schools and hiring teachers, and effort is focused on keeping children in school (to prevent "dropout"); but very little actual learning is taking place (see evidence reviewed in Muralidharan (2013) for details).

The central design challenge for the Indian education system is that it was designed for "sorting" and not for "human development". Almost every structural weakness of the Indian education system can be explained by this framework.

Turn to Appendix A for an illustration of the scale of this challenge. Indeed, perhaps the most important graphs to understand school education in India are provided in Appendix A based on data from Delhi as well as Rajasthan**.**

[3] This is why well-intentioned ideas such as scrapping the 10th board exam, are highly counterproductive in practice. This is because scrapping the signal does not remove the need for one, and such a policy ends up disproportionately hurting disadvantaged students who do not have other options for signaling their talent.

Thus, a fundamental goal for Indian education policy has to be to move the education system from a "sorting" and "selection" paradigm to a "human development" paradigm, one that will empower every citizen to be educated enough to have the foundation needed for a lifetime of continuous learning in whichever area of skill he or she may seek to learn.

The core building blocks for achieving this goal include the following:

1) Curriculum reform to reduce content and emphasise understanding
2) Exam reform to provide both "absolute" and "relative" credentials
3) A national mission to achieve universal functional literacy and numeracy by class 3
4) Universal pre-school education to support school readiness before first grade
5) Reform of teacher training to emphasise pedagogy over theory
6) Having greater clarity on the role of the state and the market in providing education in India — and both leveraging the private sector to achieve India's education goals, and regulating it adequately as needed (this requires reforms to the Right to Education or RTE Act).
7) Creating high-quality vocational education streams in school and integrating these with practicum-based training programs for vocational education (in grades 7-12)

It is also essential for education policy to emphasise certain key crosscutting themes that have been neglected for the most part in education policy discourse in India — which so far has focused more on "what" to do rather than "how" to do it in a manner that is compatible with fiscal and capacity constraints. These include:

1) Using evidence and research to better inform policy choices
2) Cost-effectiveness
3) Governance

The cross-cutting themes are discussed first, followed by a more elaborate discussion of the seven building blocks identified above:

Themes:

1) **Using evidence and research to better inform policy choices:**

   The last fifteen years has seen a sharp increase in the quality of evidence available on the effectiveness of various policies at improving education outcomes. Yet, this evidence is typically not reflected in the "business as usual" policy choices that are made by the Union and state governments. Thus while education policy makers should definitely conduct extensive consultations, it is essential to put more weight on recommendations backed by high-quality evidence.

2) **Cost-effectiveness:**

A second key theme is that of cost-effectiveness of policy recommendations. Prior education policy exercises have been strong in articulating visions for education, but have usually paid less attention to the details of **how** this vision can be achieved keeping in consideration the financial and administrative constraints within which policies have to be framed and implemented. Given the combination of fiscal constraints and strong needs for spending in several sectors, a responsible policy exercise has to consider the cost-effectiveness of various policy options to achieve a given set of goals.

In particular, the evidence from high-quality studies above suggest that it may be possible to achieve sharp improvements in education outcomes even without increasing spending — by reallocating expenditure from less to more cost-effective interventions and policies. Since it is often politically difficult to cut any kind of existing spending, at the very least it is important to allocate new spending for education in cost-effective ways.

It is worth paying special attention to the issue to teacher salaries, which comprise the largest component of education spending. Several studies have shown that there is no correlation between the level of teacher salaries and their effectiveness at improving learning outcomes. Yet, it is likely that many states will implement the Seventh Pay Commission award, which will absorb the vast majority of any increase in education spending in the coming decade, while being highly unlikely to improve learning outcomes.[4]

Thus, it is essential for the Union government to strongly urge state governments to innovate, and evaluate cost-effective options for improving education outcomes and to use the fiscal and policy space provided by the 14th Finance Commission award to try and pivot education expenditure from less to more cost-effective policies.

3) Governance:

A last crosscutting theme that is central for achieving the goals of the new education policy is governance. Studies in the past decade have identified shocking weaknesses in the education governance in the country. Thus India has, for example, high rates of teacher absence, as well as high rates of vacancies in key supervisory positions including block and district education officer. These officials are also transferred frequently (their average tenure is less than a year), which makes effective governance very difficult.

This is a topic on which we recommend that national education policy follow the guidelines established by the NITI Aayog under its “School Education Quality Index (SEQI)” initiative.

[4] A particularly striking example is provided from a high-quality study of unconditional teacher salary increases in Indonesia, where the government doubled teacher pay in 2005 — but this very large increase led to no improvement in student learning (de Ree et al., 2017).

The goal of the state-level School Education Quality Index (SEQI) is to institutionalise a focus on improving education outcomes (learning, access, equity) as the principal aim of school education policy in India. It also recognizes that school education is primarily a state subject and aims to encourage state-level leadership in improving outcomes in cost-effective ways.

It is hoped that the annual calculation and dissemination of the SEQI, with a focus on measuring and highlighting the **annual improvement** of states will:

a) Shift the policy focus to outcomes rather than inputs and programmes
b) Encourage state-led innovation in cost-effective policy approaches to improve outcomes
c) Facilitate documentation and sharing of best practices across states.

The SEQI has developed a series of governance indicators that states will be measured and ranked on, and against which progress will be tracked over time. These indicators reflect a high-level consensus on key governance indicators, and we urge the Ministry of Human Resource Development (MHRD) and the NITI Aayog to monitor progress on these.

We now turn to discussing the substantive topics.

1) Curriculum reform to reduce content and emphasise understanding:

There is already a lot of good content and ideas in the Yash Pal Committee report on the New Curricular Framework that has not been acted on. So this section will be brief.

The current curriculum has way too much content, which in turn pushes the education system to deliver rote learning as opposed to conceptual understanding. A content-heavy approach is again consistent with a "sorting" system since the sheer volume of material to be covered makes it more likely that students with better natural academic aptitude (as opposed to better "educated" students") will score better on exams.[5]

In an age when factual information is easily available on the Internet (which in turn is increasingly widely available through smart phones), the premium on memorisation and regurgitation of facts is sharply falling, relative to the ability to be able to ask and answer relevant questions by finding facts and opinions from different sources, assessing their relative merit, and being able to effectively synthesise such content for better understanding and decision-making.

[5] For instance, exams for selecting bureaucrats in ancient China required the memorising of extensive amounts of Confucian text. Mastery of these texts would have likely provided only limited training in "how" to be a better administrator, but the sheer volume of content ensured that only students of naturally higher ability were likely to pass the exam. This is a classic example of a "sorting"-based system as opposed to a "human development" one.

Thus, a core goal of education policy should be to simplify and narrow down the volume of topics covered, and emphasise instead the ability to understand concepts, connect concepts across topics, and apply them creatively to solving newer problems.[6]

2) Exam reform to provide both "absolute" and "relative" credentials:

It is important for education reformers to recognise that despite the best intentions of educationists and national leaders to have education systems reflect a broader set of goals, the single most important determinant of what teachers, parents, and students work towards is the content and structure of the exam system. Indeed, the examination system is the proverbial tail that wags the dog of the entire education system.

Thus, reorienting the education system towards a "human development" paradigm as opposed to a "sorting" paradigm will require a fundamental rethinking of the examination system in India, which in its present form is almost completely oriented towards the "sorting" function. As explained above, it is not viable in practice to wish away the "sorting" function of an education system. The problem with the status quo however is that:

a) Improvements in learning that are at levels significantly below the examination threshold are completely undervalued by all stakeholders (parents, students, and teachers) because such improvements will not be seen in the current exam system.[7]
b) Thus, the default of instruction in the classroom pretty much follows the textbook and syllabus — regardless of the fact that the vast majority of students (at least in government schools) are way behind the curricular standards of the syllabus (as seen in Appendix A).
c) As a result, students who fall behind grade level standards before completing 8th grade typically learn very little in class. Their only hope of managing with the expectations of school is to attend coaching classes, cram from past tests, and hope to somehow pass exams (typically with very little understanding of the content).
d) While the labour market cares about actual skills, there is no credible way of learning about a student's "absolute" level of understanding/mastery of a concept. This is

[6] For secondary and higher secondary school, a related concept is to try to follow the US system a bit in terms of "modularising" the content of math and science syllabi in high school. A certain amount of tracking is then made feasible, with students working their way through "modules" at a variable pace as opposed to the entire class following the same textbook and syllabus with no differentiation.

[7] A great example of this is provided from a recent study in Delhi of the effectiveness of an after-school computer-aided learning program (Muralidharan, Singh, and Ganimian 2019). The program was incredibly effective in improving learning outcomes of upper primary students in grades 6-9 targeted by the program (way more effective in a faster time than any other intervention evaluated with comparable rigor in India). However, these learning improvements were taking place at a level of learning that was 2 or 3 grade levels below the currently enrolled grade. Thus, the substantial improvements in learning were NOT seen on the grade appropriate school exam. This may explain why parental demand for the program was low even though it was so effective at improving learning.

because the marks on a grade-level exam mainly serve to “rank” students for admission to higher levels of education and do not convey any information to parents, students, or employers about the absolute level of mastery of any relevant skills.

Thus, a key reform that is needed is to have a National Testing Agency that can prescribe standards for “absolute” levels of proficiency at topics, that are broken down at a much more granular level by subject and grade (similar to how software-based learning applications like Khan Academy and Mindspark are structured).

The availability of modular assessments that are organised in ascending order of skills, will provide a critical source of feedback to parents, teachers, students, and employers about the absolute competence that a student has attained, and about the progress made at regular intervals (say every month to three months).

While exams will continue to serve a “sorting” function based on student rank, the goal is for the education system to focus on absolute progress made by each student relative to his/her own prior level (regardless of the rank of the student in class and the extent to which he/she is behind the grade level standards).

Thus, the nature of assessments will need to shift from saying “Student X scored Y per cent in the class 5 exam” to saying “Student X has demonstrated the following levels of absolute competence in various topics/domains”. The levels can range from “not demonstrated” to “mastered” and would aim to provide feedback to parents and students (and eventually employers) about functional competencies as opposed to arbitrary marks.

In the long-term, such assessments can be administered through technology-based platforms — which would enable dynamic adaptive tests and also ensure integrity of measurement through large item banks. But, in the short term, such assessments can be carried out through pre-printed worksheets for various topics.

This is an incredibly important reform to ensure that the millions of children who are behind grade level and at risk of being left behind permanently are encouraged to make “absolute” progress regardless of their level. It is also a critical enabler of skilling and vocational education for students who may not take an academic track.

A key challenge for the skilling sector in India today is that the students who enter skilling or job-training programs have very poor literacy and numeracy — and are thus often not equipped even to handle the curriculum of the skilling programs. This is because by the time students are earmarked for vocational tracks in school and directed to such programs, they have already fallen far behind the curriculum and have weak foundational skills.

Having credible signals of absolute credentials of learning will help students, parents, teachers, providers of higher education (including vocational and skill-based education) as well as employers.

3) A national mission to achieve universal functional literacy and numeracy:

The single biggest failing of the Indian education system is the fact that, 70 years after independence, a majority of children completing primary education are still not functionally literate and numerate. This is both an economic and a moral failure. The lack of such foundational literacy and numeracy both inhibits the skill formation needed for economic growth and also robs millions of children and youth of the opportunity to participate in the broader economic growth of the country — as well as to become empowered citizens who are able to navigate a fast-changing world.

We believe therefore that **the single most important outcome that education policy needs to deliver on for the future of the country is to ensure, by 2022, universal functional literacy and numeracy of all schoolchildren by the end of grade 3.** Indeed, the history of Indian education policy suggests that trying to do too much may have prevented it from achieving even the basics.

Thus, even if the entire education system is able to achieve just this one goal in the next few years in mission mode, and establish processes to make sure that every cohort entering school starting in the academic year 2019-20 has achieved universal functional literacy and numeracy by the end of third grade, that will be an enormous success.

Achieving this goal will be enabled by three key sets of investments. The first is **universal preschool education** to ensure better school readiness by the start of first grade (described in further detail below). The second is providing supplemental **instructional support to children who are falling behind** in the early grades itself to ensure that every child is functionally literature and numerate by the end of grade 3 (this is especially important for the children currently in school). The third is **investing in independent measurement** and monitoring of the achievement of these goals (at least at the district level) and motivating the entire district education machinery to achieve these goals through a suitable combination of recognition and rewards.

The most essential immediate (and easily actionable) step to enable this is supplemental instructional support in the early grades. This support will be for small-group instruction that is pitched appropriately at the level of the student. Consultations with teachers clearly indicate that they are aware of this need — but are not able to simultaneously complete the

curriculum in the textbook while also providing such supplemental instruction for children falling behind. At the same time, a large body of high-quality evidence (based on randomised controlled trials) from multiple states in India has shown that it is possible to achieve rapid progress in foundational literacy and numeracy within a few months provided children are taught in small groups at the right level – even if this instruction is delivered by modestly-educated (secondary or higher-secondary school level) youth from the same area.[8]

We therefore recommend a budget be provided to every school for the hiring of part-time tutors (who could even be students in secondary or higher secondary school from the same village/area) to be able to provide such supplemental instruction. Such tutors can work under the guidance of regular teachers and provide one to two hours of supplemental instruction every day to students grouped by their learning level. Combined with independent monitoring of learning outcomes, such an approach is likely to be successful in a cost effective way.

Note that we do NOT recommend the return to a para-teacher or "shiksha karmi" model (which has weaknesses on multiple fronts including professional, legal, and political). Rather, the extra budget to hire part-time tutors can be seen as a way of supporting a five-year national mission to ensure universal foundational literacy in numeracy.

In the medium to long term, as part of a systematic reform of teacher training and preparation, we recommend a new approach to preservice teacher training that emphasises substantial amounts of practical teaching as part of the training/credentialing process (see details below). Over time, we recommend that the time spent in such practical training by students training to become teachers can be focused on providing the small-group supplemental instruction needed to achieve this goal.

4) Universal preschool education to support school readiness before first grade:

Large gaps in learning levels emerge even in the early years of schooling, attributable in large part to the substantial increase of first-generation learners in the schooling system. Thus we strongly recommend a national commitment towards universal preschool education to support school readiness, and help achieve the goal of universal functional literacy and numeracy by grade 3.

In practice, there are two different approaches to implementing this goal. The first is to add a year of kindergarten to the school education system. The second is to strengthen the quality of early childhood education in the Anganwadi centers, by adding an extra Anganwadi worker who is dedicated to delivering early childhood education (which will

[8] Banerjee et al., 2007, 2017

allow the current worker to continue focusing on child nutrition and health). There are advantages and disadvantages to both approaches, as outlined below:

The main advantages of the Anganwadi-based model include:

a) Greater proximity to households (this is important because attendance is highly sensitive to distance at younger ages)
b) The curricular needs of early childhood education are substantially different from those of school education and need to focus more on play, self-regulation, social skills, and school readiness more generally. This may require specific forms of training and may be better delivered in an Anganwadi center. There is a risk that preschool education that is based in schools may simply result in standard classroom instruction being conducted at a younger age (since such a structure is likely to draw on teachers who are currently teaching primary grades)
c) Since Anganwadi workers are typically hired locally in the same village, they are both more connected to the local communities, and likely to have lower rates of absence (compared to teachers who typically live in urban areas and commute to rural postings)
d) Finally, the Anganwadi worker-based model is likely to be much more cost-effective (even after adding an entire extra Anganwadi worker to each Anganwadi center to focus on early childhood education) relative to a model of hiring more regular teachers in government schools. Given the fiscal constraints in expanding early childhood education, this is a very important consideration and is likely to make it easier to scale across the country.
    a. For instance, based on very recent research in Tamilnadu on the impact of adding an extra worker to Anganwadis to focus on early childhood education, we estimate that the present discounted value of the policy was around Rs. 16,000 – 20,000 per month. Thus, the investment in the extra worker would be cost effective at a monthly salary under this range but not above.
    b. At present costs, it would be cost effective to add an Anganwadi worker to focus on early childhood education (since average monthly Anganwadi worker salaries range from Rs. 4,000 – 10,000). But given regular teacher salaries of Rs. 30,000 – 60,000, the school-based model would not be cost-effective.

However, there are also some advantages to the primary school based model. These include:

a) Greater ease of attendance for siblings when the older child is of school-going age, while the younger child is of preschool age.
b) Greater scale in terms of facilities.
c) Potentially doable at lower cost if the system has a large number of “surplus” teachers due to declining enrollment in government schools (but this should likely not be a reason to expand regular teacher hiring).

d) Finally, the quality of the Anganwadi system varies widely across states and it is possible that the Anganwadi system in some states is too dysfunctional to rely on for early childhood education.

Thus, while the factors above point towards the likely superiority of the Anganwadi-based model, it is important to recognise the variation across states and not impose a specific model — as long as states deliver on universal early childhood education.

5) Reform of teacher training to emphasise pedagogy over theory, and the inclusion of extensive practical training:

Pre-service training: The teacher is the single most important determinant of the quality of education received by the student, and it is hoped that having qualified/credentialed teachers will help improve the quality of education – and indeed, a cornerstone of the RTE is a requirement that all teachers possess a formal teacher-training credential.

Unfortunately, this requirement is not supported by the evidence. In particular, several studies have shown that **there is no correlation between a teacher possessing a formal teacher training credential and his or her effectiveness in the classroom** as measured by improvements in learning outcomes during the period that students are with that teacher.[9]

Of course, this does not imply that teacher training cannot be effective. However, the evidence is also very clear that the status quo of teacher training is broken and ineffective (this point is also made clearly in the Justice Verma Commission report of 2012). There are several reasons for this part of which two are particularly important.

The first is the poor quality of the majority of teacher training institutes, especially the ones based on distance learning or correspondence courses (which have no practical training at all). Second, a content analysis of even the better teacher training programs indicates that the curriculum mostly emphasises the history, theory, sociology, and philosophy of education and has very little focus on pedagogy and also very little practical training. In contrast, global evidence suggests that the most effective forms of training in professional roles involves extensive practical training and learning on the job[10].

We therefore recommend a new paradigm for teacher training and professional development that places much more emphasis on **practical training through apprenticeship** as part of the teacher credentialing process. Specifically, we recommend that the ideal structure for pre-service teacher training should intersperse modules of theory with extensive amounts of practicum-based training that will lead to formal teacher training credentials that reflect this practical experience and learning.

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[9] Kingdon and Teal, 2010; Muralidharan and Sundararaman, 2011; Muralidharan, 2012

[10] Muralidharan, 2016

We recommend the setting up of a few apex teacher training institutes in each state (in highly reputable public and non-profit private institutes) to design such a program. We also recommend that such practicum-based teaching degrees are four years long and admit students after 12th standard. For elementary school teachers this would result in a B.El.Ed (practice) degree and feature at least 6 months of classroom-based practical training each year so that over a period of four years at least half the time is spent on training in the classroom. For secondary-grade teachers, such a program could be five years long and combine a three-year bachelor's degree in a subject with a year of education theory and a year of practical training.

We also recommend a close integration of such training programs with the public schooling system, so that trainees are effectively integrated into the schools where practical training will take place and **can provide meaningful instructional support in these schools**. Consistent with RTE norms, the trainees will not be responsible for classes on their own, but will function under the close guidance and supervision of the regular teachers and assist in instructional tasks (especially small group instruction to support the achievement of universal functional literacy and numeracy for all primary school students).

During the period of practical training, we expect that the training institution will continue to engage with the students through online and smartphone-based interactions – including viewing videos and answering quizzes, writing reflections of their teaching experience, and participating in virtual communities of practice with other trainees. Thus, the goal is to achieve a deep integration between theory, practice, and reflection on how the two inform each other during the course of pre-service teacher training.

We expect such a teacher training programme to be both prestigious and coveted since (a) the number of places will be limited and admission will be restricted to top scoring 12th standard graduates, (b) the fees will be waived/subsidised for many students because the practical training includes an element of serving under-served areas, and (c) students will also be paid a modest stipend (paid for by the education department) for their months of practical training when they will be working in schools.

To address the challenge of spatial mismatch between where the academically strongest students are (typically urban areas) and where the teaching needs in the government schools are the greatest (typically rural areas), we recommend that admission to such a prestigious integrated teacher training program be geographically dispersed.

For instance, one approach would be to **admit the highest scoring applicant from each panchayat into the programme**, with the understanding that the practical training will be based in a government school in the same panchayat. A further advantage of such an approach is that it enables greater female participation in rural areas by providing training/employment opportunities in the same village. Various aspects of reservations and quotas can also be implemented but may need to be achieved at the district for block levels.

Over time, we also recommend that the process of hiring regular teachers give extra points for each year of actual teaching experience (with years spent as part of practical training counting for credit). Our vision therefore is that in the long term almost all teachers hired into the regular government teaching positions will have completed such integrated practicum-based teacher training programmes.

Such an approach will have several advantages including:

a) Improving the quality of preservice teacher training by requiring actual pedagogical experience as part of the credentialing process;
b) Improving the ability of trainee teachers to absorb the significance of the theoretical content that is present in typical programmes by observing how these issues matter in practice;
c) Ensuring that teachers entering the education system with permanent jobs (as is typical for government teachers) would have had adequate experience in classroom management and functioning as teachers before obtaining lifetime appointments;
d) Providing a cost-effective way of augmenting instructional resources in government schools. In particular, this would be a more sustainable way of enabling schools to have the teaching resources to provide small group supplemental instruction for first-generation learners to ensure universal foundational literacy and numeracy for all future cohorts of children in the Indian education system.

We believe that implementing such an approach to pre-service teacher training can be transformative in improving the long-term quality of Indian education both through its impact on improving of pipeline of entrants into the teaching profession and through its immediate impact on ensuring universal foundational literacy and numeracy (through the supplemental instruction provided by the trainees as part of their practical training).

While the approach above can help with improving the long-term quality of teachers, urgent attention is also needed to the problem of in-service training for the hundreds of thousands of incumbent teachers, many of whom have entered the system with very poor preservice training. The biggest challenge in implementing such in-service training is the complete lack of visibility on the quality of such training. Thus, while most states teacher policies provide for around 20 days a year of in-service training in practice these trainings are extremely variable quality and our interactions with stakeholders suggest that these are typically not effective.

Thus, improving the quality of in-service training needs to focus on a few key principles. First, emphasizing effective pedagogy (especially through sample demonstration lessons to illustrate various aspects of effective pedagogy including content, engagement, inclusion, and student support). Second, it needs to curate the quality of the in-service training programs. Third, it needs to ensure that the training is actually done as per the regulatory norms, and that **teachers are assessed on their comprehension of the training content**.

We recommend that the most promising practical way of achieving these goals is to make much more use of online teacher training content. Specifically, we recommend developing a **portal for in-service teacher training** that can host thousands of videos (including translations in all major Indian languages), and training modules for various topics that are relevant for in-service teacher training. For instance, a training module could illustrate how to teach the class in an interactive way that engages students as opposed to simply reading from the textbook writing on the blackboard and demonstrate this with short videos. Others could illustrate effective ways of teaching specific concepts. Yet others could illustrate inclusive teaching practices that engage all students and not just the academically stronger ones.

Such a portal would be able to achieve all the principles outlined above. The modules would emphasize pedagogy and provide the training in modular bits as opposed to daylong programmes (research strongly suggests that students are more likely to absorb new material in capsules rather than traditional lecture-based instruction). The portal would allow teachers to rate the quality and usefulness of different kinds of content and therefore create a crowd-sourced way of identifying high-quality content (which would reflect the wisdom of teachers around the country). Finally, by providing each teacher with the unique ID to access the portal, it becomes easy to track usage, absorption of materials (through short quizzes at the end of modules), and completion of annual in-service training targets. Over time, modules can be organised into courses, and demonstrated mastery of the content of in-service training courses can become an input into identifying effective teachers, and promoting them into roles of greater leadership and responsibility.

The Diksha portal developed by the Union human resources development ministry implements these principles for content creation, but delivering full potential will also depend on integration into teacher evaluations, increments, and promotions along the lines outlined above.

6) Private School Regulation and RTE Reforms:

While central and state departments of government mostly focus on government-run schools (for whom they have implementation responsibility), **it is imperative that education policy account for the very large prevalence of private school providers.** Recent estimates suggest that over 40 per cent of school enrollment in India is in private schools, with the share being over 70 per cent in several large cities.[11] The total share of private school enrollment in the 20 largest states is around 55 per cent at the secondary and higher secondary level.

A national education policy should focus on the quality of education received by every student in India and not distinguish between whether a student is enrolled in a public or a private school. Thus, a critical enabler of improving education quality in India is expanding the supply of high-quality institutions (both public and private).

[11] FICCI Ernst & Young Report, 2014

However, there are severe constraints on the entry of high-quality private school providers – most notably placed by the RTE. We now have data to assess the implementation of the RTE to offer an informed view on how this has affected education quality and availability in India.

There are two important reforms to RTE provisions on private schools that we recommend:

1) Regulation of Private schools based on disclosure and not based on input mandates:

The RTE's input-based approach to education quality never made sense given the extensive evidence finding that most school inputs are neither necessary nor sufficient for improving learning outcomes. This has led to an unnecessary and disruptive closure of several low-cost private schools that parents were choosing of their own accord. In many cases, even government schools are in violation of these input-based norms. We therefore recommend:

Repealing all input-based mandates for schools under the RTE (for both public and private schools) and changing the approach to regulation of private schools **to be based on transparency and disclosure as opposed to input-based mandates**. By focusing regulation on disclosure, policy would acknowledge the considerable variation across India and allow diversity of models of effective schooling to emerge. Regulation is still important, and private schools can and should still be sanctioned for lying, but should not be have to meet input mandates.

Such an approach will facilitate (as opposed to inhibit) the expansion of quality private-school providers and allow for variation in approaches across locations and providers. As an aside, it would also facilitate localised cost-effective innovations by government schools, which may be made difficult by the RTE (such as hiring tutors without formal teaching credentials for providing supplemental instructional support).

2) Introduce a national policy for charter schools (that will at least permit serious pilots):

The goal of RTE Clause 12c was to provide students from economically weaker sections (EWS) with the opportunity to attend private schools, and aimed to reimburse private schools for this.

The fundamental problem with this approach is that it was **based on confiscating existing capacity in private schools for a social purpose as opposed to creating new capacity.** Further, it was deeply illiberal in that it was basically a stealth nationalisation of a quarter of private schooling capacity without adequate compensation. Finally, data over the past five years show that several states have (a) set the reimbursement rates considerably below the norms in the law, and (b) in many cases not reimbursed private schools in a timely manner.

The consequence has been a steady shutting down of non-minority private schools who have not been able to bear the burden of the cross-subsidy imposed on them by the RTE.

We therefore propose that RTE Clause 12c be replaced with an approach to public-private partnerships that achieves the equity aims of RTE Clause 12c while also increasing the supply of high-quality education options in India.

Specifically, global evidence suggests that charter schools – **which are public schools that do not charge fees** (because they receive public funding equal to the per-child variable cost in the public system) **and cannot admit students selectively**, but managed by private entities with operational autonomy (especially over teacher hiring and accountability) – have been successful at substantially improving outcomes for disadvantaged students while also increasing the total supply of schools.

Indian evidence[12] suggests that private schools are more productive than public schools (delivering similar or modest improvements in learning at a much lower cost per child). Thus, if privately-managed schools (with autonomy over teacher hiring, retention, pay, and performance management) were to have the same level of per-child spending as the current government-schooling system, we could potentially substantially improve learning outcomes without increasing the spending/child from the status quo (although there is no direct evidence of this to date). There are hundreds of high-quality operators of private schools who would be willing to operate hundreds or thousands of new schools (or take on management contracts of existing government schools) that serve EWS students if offered a reliable per-child compensation by the government that is of similar magnitude to the current spending per child in government schools.

Of course, leveraging such operators for providing a public interest good like education will require adequate oversight and regulation. But an enabling framework for such an approach could put India on a qualitatively different path for improving education outcomes in the coming decade. At the very least, such policy guidelines to this effect can motivate serious pilots and evaluations of this approach.

7) Taking vocational education seriously:

The jobs crisis in India is partly a skills crisis with millions of "educated" unemployed youth on one hand and employers routinely complaining that they cannot find adequately skilled manpower. A major reason for this is the focus of the education system on passing exams (usually by cramming) with no real understanding of the subject matter.

While there is not enough research on vocational education in India to have evidence-backed ideas for policy, there is suggestive evidence from the US of the importance of integrating vocational education into secondary and higher-secondary school curricula. Recent research suggests that the rising "college wage premium" (defined as the wage increase of a college graduate relative to high school) may not be being driven only by a more complex economy and the greater need for higher education (as is commonly believed). Rather, it suggests that this may be explained at least in part by changes in high school curricula. Specifically, Alon (2018)

[12] Muralidharan & Sundararaman, 2015

shows that high-school curricula in the US used to have substantial vocational content up to the 1950s but that this changed in the 1960s to focus almost exclusively on college preparation.

While this made sense for students who did go to college, it may have worsened labour market outcomes for those who did not – since their high-school education did not suitably prepare them for the labour market (compared to previous curricula that had more vocational content).

It is important for India to not repeat this mistake. Vocational education is widely seen as not desirable and something that is only chosen by students who are not academically smart. This will have to change if we are to provide the human capital needed to enable inclusive growth.

Some of the leading education systems in the world, including those in Singapore, Germany, and Switzerland, feature tracking of students into vocational streams after grades 6 or 7. This allows these students to obtain more human capital than they would obtain by staying in school, through a combination of vocational classroom training and practical training or apprenticeships. The training is also linked to credible credentialing (which is sorely missing in our current skills eco-system). This enables markets to pay a wage premium for skills; qualified workers in technical fields can earn middle-class wages and incomes.

India would do well to think seriously about such an approach, which would likely better serve the millions of students who “pass” exams but cannot find jobs because they have no real skills.

Appendix A: Heterogeneity and learning levels in middle and primary grades

The figures below show the levels and dispersion of student achievement in Mathematics and Hindi in samples of students from two states, Delhi and Rajasthan. This comes from two separate studies using the Mindspark software (developed by Educational Initiatives, an Ahmedabad-based company) with government school students in these states.

The graphs rely on two pieces of information – (a) the grade that students are enrolled in and (b) the software's assessment, based on a common diagnostic test given to all students at the beginning of the intervention which assesses their actual ability levels. This can be thought of as the software's assessment (based on all questions answered) of the achievement level of the child (and is the level at which the software will begin to pitch instruction afterwards).

The first graph comes from a sample of students from five government schools in Delhi who had chosen to take part in an evaluation study of Mindspark and had been selected randomly by lottery (and is reproduced from Muralidharan, Singh, and Ganimian, 2017).

Note that the main reason that these data rely on computer-based assessments is that the tests are administered without ceiling or floor effects. This dynamic testing allows us to measure the exact learning level of each student. In contrast, paper and pencil tests (typically of grade level content) suffer from severe floor effects in the Indian context. Thus, if a student has a very low score on such a test, we have no idea as to *how far below* grade appropriate competence the student is (whereas this is not a problem on a dynamic computer-based test).

There are three key patterns illustrated by this graph:

1) By the beginning of Grade 6, students are, on average, 2.5 years behind in Maths
2) By Grade 9, this gap is even larger, at about 4.5 years in Maths and 2.5 in Hindi, and
3) In any given grade, the learning levels of students spa four or five grade levels.

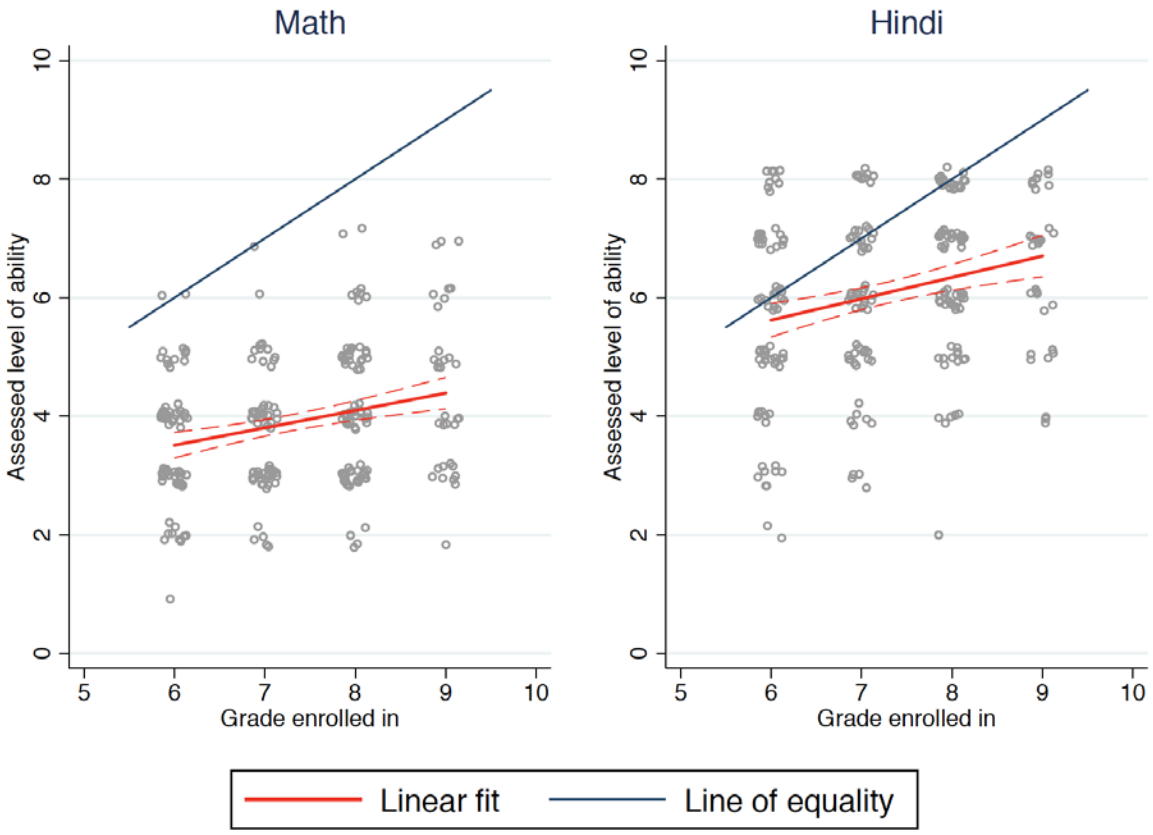
The patterns shown in these figures may well be the most important facts about education in India. While the facts about low average levels of learning are well known, this figure illustrates two additional critical points (2 and 3). In particular, the striking variation in student learning levels *within* a class highlights both how far behind grade-level curricular standards many students are, and also the extremely challenging task for teachers in government schools in handling such variation in student achievements.

Consistent with the patterns in this figure, Muralidharan et al (2019) also find that students in

the *lowest third of within-grade test scores make no progress* at all in learning during the school year, despite being enrolled in and attending school (consistent with their being so far behind curricular standards, that textbook-based classroom instruction is essentially useless).

These facts are implied by several other studies across India as well, and are likely to be an important reason for why the very large increases in education expenditure and resources in the past two decades have not translated into improved learning (because these resources do not address the binding constraint of the education system, which is that children are too far behind).

Figure 1: Learning levels in Delhi schools

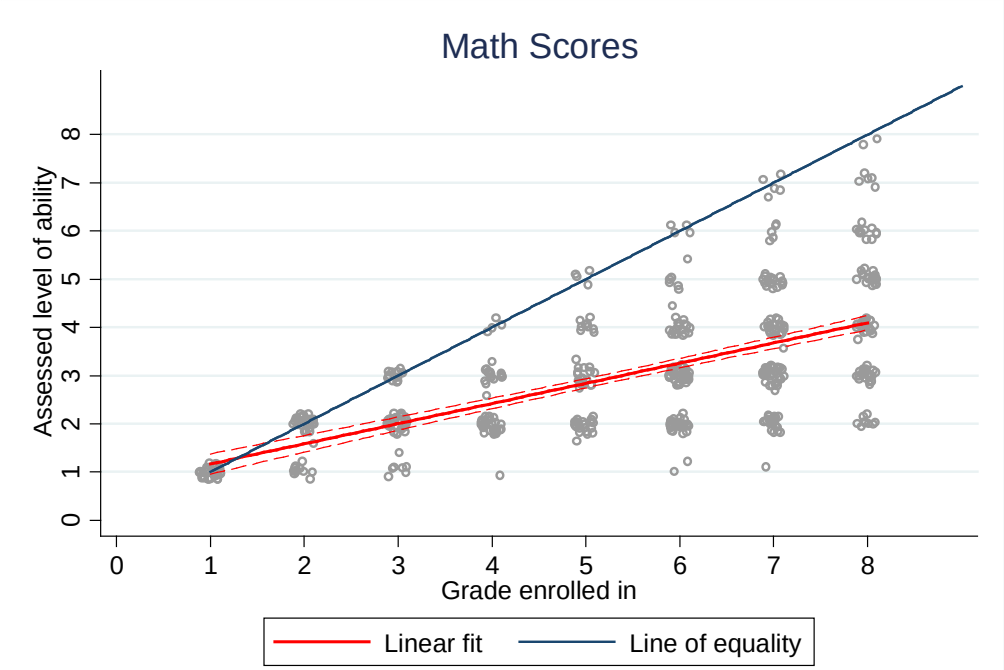


One limitation of Fig 1 is that the sample is limited, coming only from five schools in one city and, further, from a non-representative set of students who chose to be part of the study.

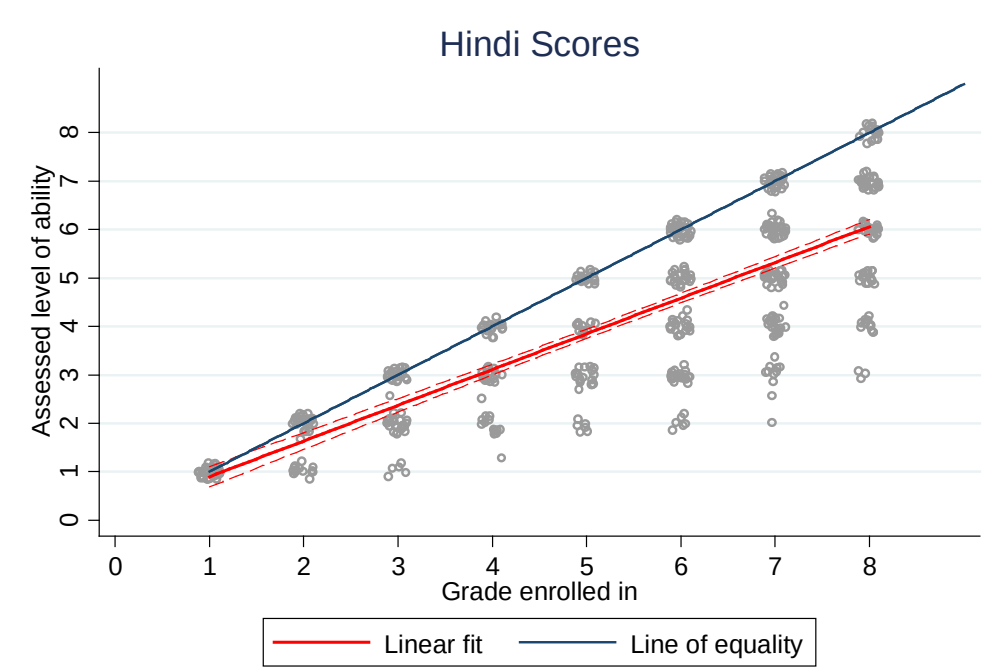
Figs 2 and 3 draw instead on a much larger sample of over 5000 students in 40 Adarsh schools in four districts in Rajasthan, covering both urban and rural areas and spanning the entire range of elementary school from Class 1-8 (from an ongoing study of the impacts of deploying the

Mindspark software in government schools in Rajasthan).

Figure 2. Learning Levels in Rajasthan Adarsh schools



Note: Each dot represents 10 students



Note: Each dot represents 10 students

All students in these grades in the program schools were covered (and hence we do not need to worry about self-selection of better/worse performing students here). As we can see, the entire pattern observed in the smaller sample in Delhi is evident also in Rajasthan: there is similar dispersion in Grades 6-8 as in Delhi, and similar deficits compared to curricula which widen over this period.[13]

Much more importantly, we see that this process of widening spans the entire period of elementary school with the **deficit from grade-appropriate standards and the dispersion within a classroom both increasing sharply with every additional year.**

These graphs illustrate the most critical constraints in the structure of the Indian education system today: the curriculum targets only the very top of the distribution and leaves most students behind; the immense variation within a classroom makes the delivery of any effective instruction very hard; and, consequently, most students are far from grade-appropriate standards even after completing the full course of elementary education.

[13] The one change is that there are now no students assessed at above grade level (unlike in Hindi in Delhi). This is an artefact of the algorithm which was modified in 2017 to cap assessed student achievement at their current grade (since the primary purpose of this metric is to fix the level at which instruction will be presented to students).

References:

ALON, T. (2018): "Earning More by Doing Less: Human Capital Specialization and the College Wage Premium," Norrthwestern University.

BANERJEE, A., S. COLE, E. DUFLO, AND L. LINDEN (2007): "Remedying Education: Evidence from Two Randomized Experiments in India," *Quarterly Journal of Economics*, 122, 1235-1264.

BANERJEE, A. V., R. BANERJI, J. BERRY, E. DUFLO, H. KANNAN, S. MUKERJI, M. SHOTLAND, AND M. WALTON (2017): "From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application," *Journal of Economic Perspectives*, 31, 73-102.

FICCI, AND E. A. YOUNG (2014): "Private Sector's Contribution to K-12 Education in India: Current Impact, Challenges, and Way Forward."

KINGDON, G., AND F. TEAL (2010): "Teacher Unions, Teacher Pay and Student Performance in India: A Pupil Fixed Effects Approach," *Journal of Development Economics*, 91, 278-288.

MURALIDHARAN, K. (2012): "Long Term Effects of Teacher Performance Pay: Experimental Evidence from India," UC San Diego.

— (2013): "Priorities for Primary Education Policy in India's 12th Five-Year Plan," *India Policy Forum*, 9, 1-46.

— (2016): "A New Approach to Public Sector Hiring in India for Improved Service Delivery," *India Policy Forum*.

MURALIDHARAN, K., A. SINGH, AND A. GANIMIAN (2019): "Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India," *American Economic Review*.

MURALIDHARAN, K., AND V. SUNDARARAMAN (2011): "Teacher Performance Pay: Experimental Evidence from India," *Journal of Political Economy*, 119, 39-77.

— (2015): "The Aggregate Effects of School Choice: Evidence from a Two-Stage Experiment," *Quarterly Journal of Economics*, 130, 1011-1066.