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EVIDENCE AND EFFECTIVE INTERVENTIONS

What Do Studies Tell Us About Improving Learning Outcomes in India?

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Introduction

Acquiring foundational literacy and numeracy skills is crucial for any child to embark and successfully move through their educational journey. This issue has gained increasing prominence in policy discussions and in implementation with respect to elementary education countries of the global south like India. Despite making significant strides in improving access to schools, India still grapples with the challenge of providing high-quality education. The World Development Report 2018 succinctly states, 'schooling doesn't mean learning' (World Bank 2018). In rural India, for instance, children's foundational learning levels are worryingly low, with less than 30 per cent of children in class III who are grade level (or have adequate foundational skills). Close to half of all class V students struggle with reading basic texts at class II level (ASER Centre 2023). Multiple assessments, such as the government's school-based National Achievement Surveys, household-based Annual Status of Education Report (ASER) surveys, several waves of the India Human Development Survey, and the longitudinal data from the Young Lives Study, have consistently highlighted the critical need for strengthening children's learning in India.

Recognising this learning challenge, India's recent National Education Policy (NEP) 2020 emphasises urgency of addressing the issue, stating:

> Attaining foundational literacy and numeracy for all children will thus become an urgent national mission, with immediate measures to be taken on many fronts and with clear goals that will be attained in the short term (including that every student will attain foundational literacy and

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> numeracy by Grade 3). The highest priority of the education system will be to achieve universal foundational literacy and numeracy in primary school by 2025.

Based on the recommendations outlined in the NEP 2020, the Government of India has launched the NIPUN (National Initiative for Proficiency in Reading with Understanding and Numeracy) Bharat mission. This ambitious initiative aims to ensure that all children attain foundational literacy and numeracy skills by class III. To achieve this target by 2026–27, each state is required to develop a comprehensive implementation plan. Consequently, various states across the country have witnessed significant changes and increased activity on the ground level, as they work towards aligning their educational practices with the objectives set forth by the NIPUN Bharat mission. Considering the ongoing efforts to improve foundational learning outcomes in India, it is crucial to gain a deeper understanding of the strategies and interventions that can effectively raise children's foundational learning.

This book aims to contribute to this important discussion by focusing on identifying and exploring the most promising approaches to enhancing foundational learning in the Indian context. To address this pressing issue, our chapter makes four key contributions.

First, we briefly discuss the evolution of initiatives that measure children learning in India, both at a macro- and micro-level classroom-based assessments. Second, we review two types of empirical studies that have been conducted in India over the last two decades focussing on children's learning – longitudinal studies and rigorous impact evaluations of 'what works'. Third, we discuss the situation of early childhood education in India in terms of access and early learning, which is crucial in preparing children before they enter class I of primary schools. Finally, based on the evidence and experiences from the ground, we suggest possible pathways as to how India can achieve the foundational learning goals laid out in the NEP 2020.

We hope that this chapter contributes to the discourse on achieving foundational literacy and numeracy in India, underlining the importance of evidence-based policy decisions and collaborative efforts to address learning challenges and advance educational equity.

Measuring Children's Learning: Large-Scale Achievement Surveys and Classroom-Based Assessments in India

Whether in India or globally, debates and discussions about children's schooling and learning have been going on for decades. In addition to expanding access and reducing inequality, India's National Policy on Education (NPE) 1986 referred to a need for 'a substantial improvement in the quality of

education' (NPE 1986). In 1990, the Jomtien Education for All conference stressed on the need to meet basic learning needs[1]

Article I – Meeting basic learning needs states as follows: 1. Every person – child, youth and adult – shall be able to benefit from educational opportunities designed to meet their basic learning needs. These needs comprise both essential learning tools (such as literacy, oral expression, numeracy, and problem solving) and the basic learning content (such as knowledge, skills, values, and attitudes) required by human beings to be able to survive, develop their full capacities, live and work in dignity, participate fully in development, improve the quality of their lives, make informed decisions, and continue learning. The scope of basic learning needs and how they should be met varies with individual countries and cultures, and inevitably, changes with the passage of time.

Broadly speaking, viewing the elementary educational landscape in the last two decades, measurement of children's learning in India can be categorised into two buckets:

(1) Emergence of national-level large-scale assessments
(2) Evolution in the use of classroom-based assessments

Emergence of National-Level Large-Scale Assessments

The turn of the century saw several interesting developments in educational measurement in India. Initiated in 2001, India's National Achievement Survey (NAS) is a nationally representative large-scale assessment of students, designed and developed by the government's premier academic institution – National Council of Educational Research and Training (NCERT). Its purpose is to evaluate the grade-level learning competencies of students at various stages of the educational system. NAS was started under the *Sarva Shiksha Abhiyan* (SSA). Initially, there were three cycles of data collection – baseline (2001–04), mid-term (2005–08), and terminal (2009–13) achievement surveys. Over the past decade, national policy has shifted from expanding school access to improving the quality of learning in India. Consequently, NAS has become a regular process, with each round referred to as a cycle (e.g. the terminal round is now called Cycle 3). These cycles capture student performance and inform key policy decisions in education. Over the years, NAS has evolved in scope and methodology. The most recent survey, conducted in 2021, incorporated a robust framework to measure student competencies across all types of recognised schools (i.e. government, government-aided, and private) in 720 districts throughout India.

The NAS 2021 uses a cluster and probability proportional to size (PPS) sampling method to select schools based on the Unified District Information System for Education+ 2019–20 sampling frame, ensuring a representative

sample of students across school type from different grades and demographics at the district level.[2] NAS is a school-based assessment that uses a paper-and-pencil test consisting of multiple-choice questions administered in school. It measures whether students have achieved the expected grade-level skills and knowledge in key subjects. Specifically, it assesses students in classes III and V in language, mathematics, and environmental studies, while students in classes VIII and X are assessed in language, mathematics, science, and social science, with class X students also tested in English. In addition to assessing students, NAS surveys their backgrounds and includes separate questionnaires for teachers and schools. The goal of NAS is to identify learning gaps in students' grade-level competencies and understand how various institutional and circumstantial factors affect their learning achievements. It also compares the average performance of students by location, school type, gender, and social/caste group to highlight disparities across different groups. This comprehensive approach provides a snapshot of student performance, helping policymakers and educators address educational disparities and enhance the overall quality of education in India.

A different national assessment effort was started in 2005 which is called the ASER. Unlike NAS, the ASER survey is an oral, one-on-one, household based sample survey focussed solely on foundational literacy and numeracy. India is unique in the developing world for having both of these national data collection efforts that have done repeated periodic measurements through the last twenty years.

Facilitated by Pratham since 2005, it is the largest household survey in India focusing on children's learning outcomes in all rural districts across the country. ASER follows a PPS sampling method[3] to select villages in a district. The sample is representative at the district-level of all rural children aged 3–16. Children are of all types – those enrolled in school (government or private or any other type) and those currently not enrolled in school. Approximately 600,000–700,000 children are covered in each usual round of ASER. ASER uses a simple assessment of foundational literacy and numeracy for all sampled children in the age group 5–16 (both assessments have five different levels).[4] Notably, ASER was the first nationally representative survey of children's learning outcomes in rural India that contributed significantly in highlighting the issue of low learning levels. It provides evidence on how the majority of children are lagging behind in their grade level competencies through a simple assessment framework. For instance, how many class V children can or cannot read (or do simple maths) class II level text. It also collects information on children's enrolment status, parental education, type of house, and household indicators. For each usual round of data is collected and made available in January (of the same year) so that evidence can guide action. Another key feature of ASER data is that it is available at the district level enabling easy usage and understanding of data to simplify the planning process.

In the last two decades, there have been several other noteworthy assessment initiatives. Educational Initiatives has conducted several large-scale assessments of student learning including private schools. The India Human Development Survey (IHDS), a nationally representative household survey that looks at many dimensions of socio-economic and demographic change included a measure of children's learning outcomes based on ASER tools. Finally, Young Lives, an international longitudinal study with one location in India, has also tracked children's schooling and learning over time.

Recently, the government of India has launched NIPUN Bharat mission programme for all children to achieve the foundational literacy and numeracy skills by class III. To track children's progress, the Government of India conducted the Foundational Learning Survey (FLS) in 2022 to measure the foundational literacy and numeracy skills for students enrolled in class III by taking a representative sample of schools across the country. Shifting away from the NAS syllabus-based assessment of students from different grades, the FLS 2022 focusses more on fundamental aspects of numeracy and reading comprehension, and it sets as a baseline benchmark to identify strengths and areas needing improvement to achieve the foundational literacy and numeracy goals.

Overall, India is continuing to accumulate national-level data both at the household and school level that measures children's foundational learning or competencies, which is crucial for effective policymaking and monitoring progress. NAS provides estimates for a wide range of competencies including grade level capabilities. ASER reports over the years have been providing data on basic learning outcomes to inform educational policies about the need for providing 'catch up' for those getting 'left behind'. In addition to this, the recent school-based FLS 2022 survey also measures the foundational learning of class III students by following a different assessment framework and asking around 20 questions on numeracy and reading comprehension. It shows that both these surveys measure the foundational learning but with different assessment competencies and locations. Therefore, from the point of view of large-scale assessments, India has the good fortune of having two long run national assessments and a new one focussed on NIPUN goals. All of this data and analysis will greatly enhance our understanding of how far we have come in the journey for achieving NIPUN Bharat Mission goals and universal attainment of foundational (Sustainable Development Goal 4.1.1) goal that posits that all children must be in school and learning.

Classroom-Based Assessments

As a part of NPE 1986 (NPE 1986; Programme on Action 1992), there was an attempt to layout minimum levels of learning. India's NPE 1986 referred to a need for 'a substantial improvement in the quality of education' that

could be achieved via improvement of school facilities, better teaching methods and learning materials by specifying and ensuring 'minimum levels of learning' (MLL) in primary school (NPE 1986; MLL 1990).[5]

The concept of MLL was introduced in India as part of the broader educational reforms outlined in the NPE in 1986 and further detailed in the Programme of Action (POA) in 1992. The primary objective of MLL was to ensure equitable access to education and to establish uniform standards of educational attainment for students at the primary level. It aimed to reduce existing educational disparities and ensure that every child, regardless of socio-economic background or geographic location, achieved the MLL. The MLL framework specified learning outcomes in key areas such as language, mathematics, and environmental studies (which includes both science and social science). It emphasised the essential skills and knowledge that students must acquire, such as the ability to read and comprehend basic texts, perform simple arithmetic operations, and understand fundamental environmental concepts. The MLL was designed to be easily attainable for learners and straightforward for teachers to understand and evaluate. In addition, it was meant to provide educators with systematic and concrete targets for student assessment and curriculum development. Establishing well-defined learning levels was expected to offer clear direction and enhance accountability within the educational system. The overarching goal of the MLL was to ensure that all children, regardless of their background, had access to foundational education, enabling them to pursue further learning and function effectively in society.

While MLL tried to ensure a minimum standard of learning to every child, it was also criticised on several grounds. For example, the Public Report on Basic Education (PROBE) in India, published in 1999, provided a critical evaluation of the MLL initiative by calling it as 'Meaningless Levels of Learning'. The report argued that MLL's focus on minimum competencies did not account for the varied learning needs and potential of students as it had an overambitious curriculum expectation, thus failing to foster a more holistic and meaningful educational experience. One of the objectives of MLL was to lighten the curriculum load, but it has amplified the burden of teaching and learning. Also, MLL's emphasis on standardised learning outcomes led to a rigid curriculum, which often resulted in rote learning rather than a deep, conceptual understanding of subjects. Therefore, the PROBE report criticised the MLL initiative for its failure to foster an inclusive learning environment. Furthermore, the MLL framework did not sufficiently address the linguistic and cultural diversity of India, often imposing a standardised approach that was disconnected from local contexts and realities (NCERT 1998; Sadgopal 2004). This one-size-fits-all strategy neglected the unique challenges faced by students from different regions and backgrounds, leading to a lack of engagement and relevance in their learning experiences (NCERT 1998). Overall,

there were worries that teachers would only focus on the minimum levels and ignore many other facets of teaching and learning. The major criticism was that teaching needed a more flexible and context-sensitive approach that would accommodate diverse learning needs and promote equity, creativity, and critical thinking among all students.

In 2001, the District Information System of Education (DISE) started capturing data related to school infrastructure, teacher qualifications, student enrolment, and dropout rates. Data was collected at the school level and then aggregated by district and state. From 2003–04, DISE began to report data collected at school level about pass percentages at different stages of the elementary school system. The data presented referred to the percentage of students who passed class V and also those who passed with 60 per cent and above marks in class V and class VIII, and it continued to report this till 2015–16. DISE Flash Statistics reports on elementary education in India shows that there has been an increase in percentage of students who passed with 60 per cent and above marks in class V, from around 45 per cent of boys and girls in 2003–04 to 62 per cent in 2015–16 (DISE Flash Statistics Report 2005–06, 2015–16). Similarly, the percentage of students passing with 60 per cent and above marks in class VIII increased from around 40 per cent in 2006–07 to 56 per cent in 2015–16. While the substance of what 'passing with 60 per cent' may vary from school to school and district to district, the DISE data provide a broad measure of how children were performing as assessed by schools.

The National Curriculum Framework (NCF) 2005 considered the student assessment as an integral part of the teaching-learning process instead of yearly exams and recommended the reforms in assessment with the Continuous and Comprehensive Evaluation (CCE) system. Following the Right to Education (RTE) Act instructions, CCE was introduced in Indian school education in 2010–11 for classes I–VIII, which aims to shift the focus from rote learning to a more holistic and child-centred approach to assessment beyond their academic achievements. The CCE framework emphasises continuous assessment of students' academic progress and co-curricular development throughout the school year, rather than relying solely on end-of-term exams. This comprehensive evaluation system can provide more flexibility to teachers for individual student diagnosis and remediation.

A study by UNICEF (2016) reviewed the CCE implementation in schools across six states in India. The study highlights that CCE has the potential to create a more engaging and less stressful learning environment for students, but its implementation has faced several challenges (UNICEF 2016). It found that many teachers were able to identify students who lag behind in classes and support them adequately. However, there is a lack of academic support and proper training for teachers, and unclear guidelines on how to assess students, etc. The CCE requires schools to focus on a wide range

of skills and abilities, but many schools, especially in rural areas, do not have the necessary resources and support to do this effectively such as multi-grade classrooms and teacher shortages. Also, it is not able to provide equitable learning to all children as teachers focus and engage more with children who are fast learners and cope with the syllabus completion. To achieve the CCE objectives of fostering all-round student development, the study recommends that there is a need of fundamental changes in the teaching-learning processes, better training and support to teachers, clearer instructions on how to assess students, and a focus on building a more consistent and equitable implementation strategy across the educational spectrum.

The recent NCF 2023 document discusses two types of assessment, namely formative and summative, which play an equally important role in teaching-learning processes. First, the formative assessments are continuous and provide ongoing feedback to both students and teachers through which teacher-learning can be improved. This type of assessment involves low stakes regular activities, such as quizzes, assignments, classroom discussions, and observing student behaviour, that help in monitoring student progress. The objective is to identify strengths and areas for improvement, enabling teachers to tailor their instruction to meet individual student needs and enhance learning outcomes. The summative assessment, on the other hand, is used to evaluate student learning at the end of an instructional period, such as the end of a term or academic year. This type of assessment includes methods like final exams and standardised tests, which aim to measure how well students have met the learning objectives set forth in the curriculum. In India, summative assessments are often critical for determining grades, promoting students to the next grade level, and preparing them for further educational opportunities. While these assessments provide a comprehensive snapshot of student achievement, they can sometimes lead to high levels of stress and a focus on rote learning, as students prepare intensively for high-stakes tests. Overall, the formative assessment focusses on assessment for learning while the summative assessment focusses on assessment of learning. Therefore, balancing formative and summative assessments are essential in creating a holistic educational experience that supports both continuous learning and accurate evaluation of student performance.

To conclude, national-level assessment surveys, such as NAS, ASER, and FLS, serve as important tools to capture the overall health of the Indian education system by providing a snapshot of student learning outcomes across the country. These large-scale assessments measure the performance of students in achieving foundational learning (and achievement in key subject areas) and highlight learning disparities between different regions and socio-demographic groups. However, while these national assessments offer valuable insights into broad trends and systemic issues, they function more like a 'temperature check' rather than a comprehensive solution for

improving teaching-learning practices at the ground level. Therefore, to drive meaningful improvements in children's learning outcomes, it is also essential to design and implement classroom-based assessments and continuous evaluations that guide teachers to improve or revise instructional practices. These assessments, conducted regularly by teachers within their own classrooms can provide immediate and detailed feedback both on how the entire class is doing as well as on individual student progress. Unlike the periodic, large-scale assessments, classroom-based assessments allow for the identification of specific learning gaps and needs, enabling teachers to tailor their instruction to better support each student inside the classroom. By closely monitoring student performance and adjusting teaching strategies accordingly, educators can foster a more responsive and effective learning environment, ultimately leading to improved educational outcomes and a more personalised approach to student development.

Review of Longitudinal Studies of Student Learning in India and Impact Evaluations

In the last two decades, there has been extensive research on different aspects of school education in India; a subset of these studies focuses on issues of student learning. For the purposes of this section, we have reviewed two specific types of studies that may be useful as we think more deeply about effective ways to improve children's learning in India. These studies include:

(1) Longitudinal studies that track change in student learning over time
(2) Research that focuses on specific teaching-learning interventions to identify 'what works'

Studies that Study Children's Foundational Learning in India Over Time

Over the years, ASER reports have highlighted that the children's foundational learning levels in rural India have remained consistently low. Over a decade ago, only about half of class V students could read a class II level text, a figure that remains largely unchanged in 2018, with some decline in the period 2010–12. The COVID-19 pandemic caused further decline in children's basic learning levels due to prolonged school closure. Data from ASER 2022 indicates that in almost every state, basic reading and math levels of primary school children were lower than that recorded in 2018 (ASER Centre 2023). The ASER 2022 data also indicates that more than half of all who completed primary school lack foundational skills, and even after eight years of schooling, around a quarter still do not possess basic reading abilities (ASER Centre 2023).

Children's learning is influenced by a host of interrelated factors. It is often argued that the school infrastructure and inputs along with family characteristics – all have a bearing on the child's education trajectory. Like other educational surveys, ASER also collects basic information about schools and families. For example, in a sampled village, basic observable characteristics of the local government primary school like number of teachers, student attendance via head count, availability of textbooks, midday meals, drinking water, and toilet facilities are also collected. For the sampled household, basic features of socio-economic status are recorded such as whether the dwelling is made of permanent materials, ownership of vehicles, access to smart phones and computers, and parental education level. Interestingly, in the last 10–15 years, government school infrastructure has improved steadily year on year. Similarly, household characteristics like parents' education and access to technology have also been rising. Still, children's basic learning seems to remain chronically low.

The India Human Development Survey (2005 and 2011–12) assesses basic learning levels of 8- to 11-year-olds during both surveys. This data shows a similar trend and a decline in children's learning level in 2011–12. Young Lives is a unique cross-country longitudinal study that has been tracking cohorts over two decades, which started in 2001–02 and the final round in 2020–21. In India, their focus is on a sample of communities in Andhra Pradesh and Telangana. The Young Lives 2016 factsheet compared math scores of 15-year-olds in 2009 and 2015, and reveals that the learning levels are low in both years. There is not much change in children's learning levels during this period for government school children, but it shows a decline in the learning levels of private school children. It also highlights that the percentage of overage children could be a significant driving force behind poor foundational numeracy and literacy, and special attention must be directed towards these students to ensure they catch up to the expected pace.

The 2011 *Inside Primary Schools* (Bhattacharjea et al., 2011) study by the ASER Centre points out key factors of children's learning. This longitudinal study, which follows cohorts of classes II and IV for a year through 3 visits in 5 states, reinforces findings from other studies. Learning levels at the beginning of each grade are well below curricular expectations of that grade. While children do progress during the year, but even at the end of the school year, their learning levels remain far behind what they are expected to know and be able to do. Each cohort moves into the next year with this gap from the past year and has to face a new grade's even higher curriculum. In this five-state study, this is true even in states with the best overall learning outcomes. As expected, this study also found that school attendance is crucial for learning and children learn less when their mother tongue differs from the language of instruction at school.

The *Inside Primary Schools* study digs a little deeper into teachers and teaching than many other studies. It finds that teacher qualifications, training,

and experience have little impact directly on student learning. Focussing on common teaching activities, the study indicates that even though most teachers can identify common mistakes that children make, many teachers struggle to explain concepts and content in a simple way that children can grasp. Interestingly, children's learning is positively linked with child-friendly practices in the classrooms such as students asking questions, teachers using local examples, and small group work.

There are two other longitudinal studies done in recent years that are worth noting. Both studies focussed on patterns of student learning in middle schools (ASER Centre 2016, 2018). The first three-year longitudinal study was conducted in Nalanda district in Bihar and Satara district in Maharashtra. The study sampling was based on household survey and 6,000 children enrolled in upper primary classes were tracked from 2012 to 2015. The study found that those lacking foundational reading and arithmetic skills in middle school were unlikely to acquire them within the following year and were more likely to drop out. Over half of these students remained at the same learning level a year later. Unsurprisingly, children without foundational skills in the upper primary grades were more likely to be female and come from poorer, less educated families. Interestingly, although family characteristics and school inputs were relatively better in Satara, learning levels of children across the two contexts were similar.

The second longitudinal study (2014–16) was conducted in Hardoi district in Uttar Pradesh and Sambalpur district in Odisha. The study did a census of all class VIII students in 2 blocks of each district. The focus of this study was to understand the transition from elementary school to secondary school in two very different districts in the country. About 11,264 students enrolled in class VIII were tracked into class IX. Transition points are critical in a student's educational journey. In India, this transition often necessitates a physical movement from one school premise to another. Costs related to education increase as students move into higher grades. Whether in housework, in working on the household's farm or in the family business or wage work in the market, as children get older, the opportunity cost of their time rises. Families use transitions also for decision-making about whether the child should continue in school or not. It concluded that the transition to secondary school was much lower among those who did not achieve the foundational literacy and numeracy skills. Evidence from the research reinforced the belief that student's prior learning is one of the important predictors of continuation at school including through the transition from one stage of education to the next. The study found that while many students could confidently do the easier arithmetic operations, like subtraction, they struggled with even the slightly more difficult but routine operations, like division. Computational tasks that needed application and critical thinking were hard for many students as compared to straightforward numerical problems. Calculating

percentages, a task that is often needed in everyday life, was among the hardest. While access to government provision of secondary education (more in Odisha as compared to Uttar Pradesh) enabled more students to move into the next stage, without a strong foundation of learning, it seemed unlikely that the weaker students would go far in the secondary school classes.

The very unique Young Lives longitudinal study situated in Andhra Pradesh and Telangana collected education data for two different cohorts of children, an older cohort born in 1994–95 and a younger cohort born in 2001–02. It is a rich mine of information for understanding children's educational experiences and pathways over time. The study was conducted over five rounds from 2002 to 2016. The existing literature argues that early childhood is a crucial period for physical and cognitive development of children. Stunting in children during this age results in poorer educational outcomes at later stages in life. Fink and Rockers (2014) tracked the changes in stunting level of children between 8 and 15 years and its impact on their cognitive development. They found that more than one-third of children reversed their stunting by age 15, and those who managed to catch-up had smaller deficits in their cognitive development than those who remained stunted during this period. It provides evidence of the possibility to reverse stunting in adolescence. They further argue that child development is a dynamic process that can provide continuous opportunities for children to catch-up. Another study by Singh and Mukherjee (2018) using the same longitudinal data found that students who attended private preschool as compared to government preschool were much more likely to score higher in mathematics and emotional well-being when they turn 12 years old. It also provides evidence of the negative effects of late preschool enrolment on their learning outcomes; those entering preschool after the age 4 had poorer cognitive outcomes in later years. This evidence emphasises the importance of age-appropriate admissions to facilitate streamlined learning outcomes for students.

Using Young Lives data, a study by López Boo (2016) tries to unpack the role of mediating factors to explain the gap in cognitive outcomes between low and high socioeconomic status household children during two rounds. It finds that the impact of socio-economic status on children's learning decreases with time but is still significant after controlling for the medicating factors such as urban residence, early childhood nutrition and education, and caregiver's education. Moreover, caregiver's education shows up as a critical mediating factor even after controlling for socioeconomic status. It also reflects key aspects of a child's environment including parental practices, language levels, nutrition, and preschool quality, which are often influenced by more educated parents. Therefore, it suggests that it is essential for early childhood development programmes to focus on children with poorly educated caregivers.

Another recent study identifies the factors explaining the learning gap in math score among the high and low performing children over a period of four years (Parvez 2023). On an average, the high performing children had better background characteristics than the others, which explains a considerable part of the learning gap between both groups. The findings show that attending private school, in addition to mother's education and time allocation, was one of the major factors that explained the learning gap when the children were younger. However, the role of private school in explaining the learning gap became insignificant after four years, and the average years of schooling becomes significant in determining this gap. This study indicates that the importance of different types of educational resources changes with different levels of education.

Evidence from the studies reviewed above highlights a key feature of the learning situation in India – low foundational learning levels and relatively flat learning trajectories over time. The studies discussed above suggests various factors contributes to this situation such as inadequate early childhood nutrition and development, lacking access to quality preschool education, age-inappropriate admission, suboptimal teaching-learning processes, and different medium of instruction in school than the home language, and school absenteeism. There has been a persistence of learning disparities based on access to school type, location, parental education level, socio-economic status, and household educational investment, etc. In addition to the influence of household characteristics on children's learning, very different sets of contexts (like Satara and Nalanda) seem to be correlated with similar learning profiles. The evidence also shows that child development and learning is a dynamic process in which children can catch-up over time.

'What Works': Impact Evaluations of Specific Education Interventions

In the last 20 years, impact evaluations of programmes in the social sector using randomised control trial (RCT) methodology have become increasingly common across the world. There have been several such studies done in India that study education interventions to understand how the project or programme affects student learning. We have looked at studies that look at 'outside the school factors' (like information, community engagement), also those that focus on in-school factors (such as teachers, incentives), and finally at several studies that look closely at pedagogical and teaching-learning interventions. The RCT approach can help to answer the question about whether a specific intervention results in better outcomes as compared to control groups since the intervention has been randomly assigned.

The studies reviewed here address the following broad questions about 'what works' to significantly improve children's learning:

(1) Can information about children's learning shared with parents/communities improve student learning?
(2) What types of teachers and what kinds of incentives for teachers strengthen student learning?
(3) What kinds of pedagogical interventions and teaching-learning models show effective learning improvement?

Q1. Can information dissemination and community action improve student learning?

Community participation and citizen engagement have emerged as potential mechanisms for enhancing quality of public service delivery (World Development Report 2004). In India, under the RTE Act 2010, the School Management Committees (SMCs) are entrusted with the task of ensuring teacher and principal accountability to enhance education quality in schools. However, evidence on the effectiveness of these bodies is mixed. At times, members of these bodies and the communities they represent, are often unaware of the services they are entitled to and the extent of their control over these services as mandated by the state (Bardhan and Mookherjee 2005; Banerjee et al. 2010).

A quick overview of available studies on this question is provided below. An experimental study was conducted in 610 villages of three states of India, which aimed to empower SMCs by increasing awareness of their roles and responsibilities through the community-based information campaigns. After the first follow-up in which eight to nine public meetings were conducted in the treatment villages, the study found that the intervention significantly reduced student and teacher absenteeism, although the impact on learning outcomes was less promising (Pandey et al. 2009). In addition to that, after the second follow-up in which 11–14 public meetings were conducted in the treatment villages, the intervention shows that providing information improved the functioning of school management councils, increased teacher efforts, and a modest impact on student's learning (Pandey 2023). The impact of intervention after the second follow up is higher than the first. The study also highlights that the information campaigns for increasing community awareness of school functioning may produce greater gains when sustained for a long period of time (Pandey 2023).

In case of community-based intervention, Banerjee et al. (2010) found that only providing information to communities does not work unless it is accompanied by some concrete action. Therefore, mobilising the community to examine school functioning did not have any significant impact

on community involvement in school governance, teacher effort, or student learning outcomes. However, concrete action through volunteer-led classes in the community after-school had a large and significant impact on students' learning levels. At the end of reading camps, all children who were unable to read at baseline could at least decipher letters, and 35 per cent of children who could only read letters at baseline were able to read and comprehend a story.

Another study conducted in Rajasthan found that students' performance in private schools improved successfully by providing better information about school quality (across schools) through the distribution of student performance report cards to both parents and schools (Afridi et al. 2018). However, this approach did not yield similar results for government schools, which cater to the majority of underprivileged children in India. It shows that these types of information-based interventions work only in case of private schools where there is competition and a market, but may not work for government schools where there is no competition across schools.

Q2. What kind of teachers and/or teacher incentives can improve student learning?

In the last two decades, there have been several rigorous impact evaluations that explored the impact of incentivising teachers and employing contract teachers to enhance children's learning outcomes. In Rajasthan, an intervention provided teachers with incentives to improve punctuality, resulting in a 21-percentage-point reduction in absenteeism compared to the control group (Duflo et al. 2012). In addition, children in these treatment schools demonstrated significantly higher learning gains by the programme's end.

In Andhra Pradesh, another intervention awarded bonuses to teachers based on individual and group performance (Muralidharan and Sundararaman 2011). Post-intervention, schools offering incentives had significantly higher test scores than control schools. During the first year of the programme, both individual and group incentive schools achieved similar levels of performance. However, after two years, schools with individual teacher incentives yield a greater impact (0.27 standard deviations (SD)) compared to group incentives (0.15 SD). The cost-effectiveness of this approach was evident, with annual school inputs costing INR 10,000 per school, while group and individual teacher incentives cost INR 6,000 and INR 10,000 per school, respectively. Another study in Andhra Pradesh revealed that hiring additional contract teachers significantly improved student performance in the language (0.15 SD) and mathematics (0.16 SD) tests (Muralidharan and Sundararaman 2013). Contract teachers

exhibited lower absenteeism and more active teaching compared to regular teachers throughout the programme.

In the context of teacher training interventions, evidence shows that providing detailed guidance on what and how teachers should teach has proven to be effective in enhancing the skills of low-performing students (Evans and Popova 2016). For instance, an intervention in Andhra Pradesh in which providing diagnostic information to the teachers about student performance with general tips on how to improve their learning had a negligible impact on student learning outcomes (Muralidharan and Sundararaman 2010). However, this study finds a significant increase in teacher's effort in treatment schools when they were observed and monitored in the classroom. Other intervention programmes in India that provided teaching/learning material and instructions for teachers specifying the activities in which these should be used and when to use them were found to have a positive impact on children's language outcomes (He et al. 2009; Banerjee et al. 2007, 2016). For instance, He et al. (2008) shows that children's English test scores increased significantly when providing material to teach was implemented in combination to a teacher training as compared to when introduced externally without any training. Across all the experimental studies based on the Teaching at the Right Level (TaRL) approach conducted by Pratham, it was found that providing only teaching/learning materials is not effective in improving children's learning outcomes unless it is accompanied by a trained teacher or volunteer services.

Interestingly, the scaled-up TaRL intervention programme in Haryana where the teachers were trained based on the TaRL approach and provided with teaching-learning material significantly improved the children's learning outcomes (Banerjee et al. 2016). But a key feature of this intervention was that the officials above the level of the teacher (cluster coordinators) themselves practiced the TaRL approach daily. Subsequently, this cadre provided training to the teachers in their cluster and also ongoing on-site monitoring support. The recent 2023 GEEAP report suggests that the teacher training programmes can be most effective when they are implemented for longer durations and linked to a specific pedagogical method or teaching-learning materials.

Q3. Are there specific pedagogical approaches and instructional practices that lead to significant improvements of student learning as compared to situations where this is not the case?

Existing evidence indicates that effective pedagogical interventions when adapted to individual student learning levels can change students' learning experiences. In this section, we discuss different types of pedagogical interventions implemented in different contexts of India, particularly focussing on primary grade children.

Recent literature reviews have pointed to two types of instructional programmes that have been rigorously evaluated and are found to be effective (GEEAP 2023). Targeted instruction programmes (such as TaRL) and structured pedagogy interventions, that employ adaptive instruction, are the most effective intervention programmes at improving student learning (Banerjee et al. 2017; GEEAP 2023).

TaRL is an approach developed in India as a solution to low learning levels. The approach focusses on the fact that many children even after several years of schooling have still not acquired foundational skills like reading and basic arithmetic. In the meanwhile, as the child moves to each subsequent grade, classroom instruction is anchored to the grade level curriculum expectations, which get harder and harder. This results in children getting 'left behind'. If there is no focused learning support provided to children in early grades for those who are 'falling behind', it is difficult to make up this gap in later years. In the TaRL approach, children in class III and above are assessed using a simple one-on-one oral reading and math tool. Regardless of age or grade, they are then grouped by their current level. Appropriate activities and materials are used for each group. Quick progress is visible and children move from one group to the next in a matter of days. When implemented well, within 50 days (2 hours a day), a majority of children are able to acquire foundational skills.

In the last two decades, a series of RCT studies across different contexts in India show that Pratham's TaRL approach has been effective in raising children's basic reading and math levels especially in class III and above (Banerjee et al. 2007, 2010, 2016, 2017). This evidence is consistent even after scaling-up the programme in different Indian states within the government education system (Banerjee et al. 2016). For instance, in Haryana, teachers were trained by the Pratham staff, and they dedicated one hour after the school hours to teach children based on the TaRL approach. In Uttar Pradesh, Pratham volunteers ran intensive 'learning camps' for 40 days during school hours with extra 10-day camps in the summer. Both methods worked well with language skills improving by 0.15 standard deviations in Haryana and by 0.70 standard deviations in Uttar Pradesh (Banerjee et al. 2017). Also, a recent Pratham's intervention programme targeting primary school children in rural Assam, which combines standard in-school learning camps based on TaRL approach with an out-of-school study group programme managed by community volunteers, significantly improved the children's language and math outcomes (Nyqvist and Guariso 2021).

A similar targeting instruction of TaRL approach is used in several educational interventions using technology. Impact evaluations of such ed-tech

interventions show that specific computer assisted programmes that focus on targeted instruction have been found to be effective. Such pedagogical interventions that use education technology can provide promising results depending on how it has been implemented. An early version of a cost-effective computer-assisted learning programme in India enabled children to learn at their own pace, which significantly improved their math score (Banerjee et al. 2007). These types of programmes work best when introduced as a complement to the regular teaching activities, and not as a substitute (Linden 2008). However, computer-assisted learning programmes become ineffective when instruction is not adapted to the individual student's learning levels, and when the technology distribution is not accompanied by the students' or parents' training (Kremer et al. 2013).

In another study, a programme called *Mindspark* offered daily tutoring sessions in combination with technology-aided and in-person tuition support. It was found to be effective in improving student learning levels in Hindi by 0.22 standard deviations and in mathematics by 0.36 standard deviations (Muralidharan et al. 2019). Access to the Mindspark programme led to greater learning in lesser time and cost than regular government schools (Muralidharan et al. 2019).

Next, we discuss the impact of the RCT studies based on structured pedagogy in India. A recent study by Beg et al. (2023) examines the impact of remedial tutoring programmes in Odisha in which one treatment regimented remedial teaching while the other treatment had a flexible lesson plan. The intervention programme named *Utkarsh* was implemented in partnership with the government of Odisha and an NGO called Transform Schools. The study finds that both the treatments were equally effective in improving student learning. They did not find any trade-offs with reduction in children's learning gains when teachers are given increased flexibility. Both programmes were equally cost effective. They also provided evidence on perceived reduction in service delivery while using a flexible teaching approach

A large-scale study conducted in Karnataka and implemented by Akshara Foundation focused on improving the math score of children enrolled in primary schools after providing training to teachers and teaching-learning materials. They found that it had a marginal impact on student learning outcomes (De Barros et al. 2022). In their study, one intervention arm had an additional component of community engagement through community-led student contests. However, it did not improve children's learning outcomes. On the contrary, the study finds that the extra contests component negatively affects the classroom environment as it worsened the instructional quality.

Studies that Evaluate Learning Improvement Interventions in India

In this section, we discuss the impact of some well-known interventions/schemes implemented by the state governments focussing on primary school children. The government of Tamil Nadu first introduced an activity-based learning (ABL) approach in 2003 into 13 schools in Chennai as a pilot study. The ABL was gradually expanded in different phases, and in 2004–05, it was implemented in two districts of Tamil Nadu. It was then scaled-up successfully within the whole state for all students in classes I–IV in the government and aided schools by 2007–08.

In a typical setting, depending on his or her age, a child is placed in a specific grade usually with whole class instruction based on grade level curricular expectations and materials like textbooks. In the ABL intervention (usually in classes I–III), the child is exposed to an activity-based pedagogy and materials and can move at their own learning pace.

The evaluation of the ABL programme shows mixed evidence. Akila (2009) conducted a process evaluation study on a sample of around 20,000 students by linking classroom practices with the student learning outcomes. The study reveals that effective classroom processes are associated with improvement in children's language and math outcomes, and the programme has benefitted everyone regardless of their gender, school type, or community. Another study indicates that children in ABL classrooms exhibit a stronger sense of ownership over both the classroom environment, with each child allocated a portion of the blackboard, and their own learning, as they set their own learning pace and conduct regular self-evaluations (Pillai and Ramaswamy 2010). However, by using the ASER test, a study by Aslam et al. (2016) did not find a statistically significant impact of the ABL programme on children's learning. The study also suggests that the standard ASER surveys are not diagnostically rich enough to assess the success of ABL. In addition, using propensity score matching, the authors identified that students in ABL classrooms had lower self-esteem but better persistence and peer relations. The former result is driven by socioeconomic status, with students from poorer backgrounds having lower self-esteem.

Karnataka's *Nali Kali* programme has similar features to the ABL approach of Tamil Nadu. An empirical evaluation by Gowda et al. (2013) identified that *Nali Kali* had a positive and significant impact on reading scores and leadership but no significant effect on math score. Further, they identified that returns were highest in earlier grades but these benefits did not persist as students moved to upper grades. Benefits are also greater for students who were in the lower quartile in terms of their scores when they enrolled for the programme. Another study by Rajesh Raj et al. (2015) reveals a significant improvement in student performance after implementing the *Nali Kali* programme, with better outcomes observed in schools that adopted the scheme

earlier. In addition, while more *Nali Kali*–trained teachers enhance student performance, an excess of *Nali Kali* divisions within a school can negatively impact results due to the diluted distribution of teaching resources. These studies also provide promising evidence of ABL programmes on children's learning, but we need more evidence of the impact on learning in different contexts, better monitoring of programmes to see where and for whom it works better, and sustainability of the programme.

The evidence from different experimental and non-experimental studies discussed above shows the importance of evaluations in understanding 'what works' for improving children's learning. While many programmes and interventions are designed and implemented, it is essential that progress is continuously tracked and periodic assessment and evaluation is done, especially as interventions scale. Evidence-action feedback loop is a critical component of any effort focussed on improving foundational learning in different contexts in India.

Situation of Preschool Education in India

In developed and developing countries, the evidence consistently shows that preparing children through preschool education is vital for laying the groundwork for a child before entering primary school and lifelong learning (World Bank 2018). In India, the NEP 2020 emphasises the significance of early childhood care and education, including preschool education, as a crucial stage in the education continuum. It divides the foundational stage for children aged 3–8 years into two sub-stages, the first is preschool education for 3–6 years and the next foundational stage is classes I and II of primary education for 6–8 years. To align with the NEP 2020 recommendations, recently in early 2024, the Department of School Education and Literacy (Ministry of Education) directed all the state and UT governments to ensure the minimum age of 6 for admission in class I so that children are prepared for school through age-appropriate admissions. Furthermore, NEP 2020 underscores the role of preschool education in facilitating school readiness developing through the age-appropriate curricula, and it emphasises the importance of early literacy and numeracy skills development, as well as social and emotional competencies to enable smooth transition and successful adaptation to primary education. In this context, we discuss the structure and provision of preschool education in India, and how much children are prepared or not before entering to primary grades.

In India, a major component of government provision of early childhood care and education is through the *Anganwadi Centres* (AWCs) – an institution under the purview of the Integrated Child Development Programme[6] supported by the Ministry of Women and Child Development, and the *Balvatikas* – pre-primary section inside the government school buildings, which

is led by Ministry of Education through its *Sarva Shiksha Abhiyan* (SSA) scheme launched in 2018. The SSA programme also encourages state government schools to streamline children's transition process from preschool to primary school by implementing the structural changes to the existing preschool education system. First, the government primary schools can 'co-locate' an Anganwadi centre and they can also have a co-located Anganwadi as well as Balvatika inside the schools. Second, the government schools could offer a three-month bridge course to children who were about to enter class I, as a means of easing the often-difficult transition into formal schooling. In addition to this, children have the option to access private preschools depending on their availability in the region.

Now, we discuss the provision of access to preschool education for 3- to 6-year-old children in different types of institutions in India.

Over the years, ASER reports have been tracking age-grade distributions across rural India. It is perhaps the only source of data over time from a sample of rural households in which children aged 3–6 are enrolled. Depending on the local context, children in this age group typically could be enrolled in Anganwadis, or in private preschools or Balwadis. Many private schools, even in rural areas, enrol children in LKG or UKG and not directly in class I. In the years up to 2017–18, it was not uncommon to see 'underage' children enrolled in class I in government schools. With rising educational aspirations, families with limited economic resources would enrol their children well before age 6 in class I. Starting formal school too early before appropriate cognitive development has taken place and without adequate preparation in school, early enrolment can be detrimental to a children's future educational pathway. In fact, depending on the state and year of comparison, sometimes children in private schools were up to 2 years older than their counterparts in government schools.

Even before NEP 2020, some states like Assam, Himachal Pradesh, and Punjab had started pre-primary sections in primary schools. Data from Himachal Pradesh and Punjab revealed an increase in government school enrolment as a result of the pre-primary provision in regular primary schools.

Post-NEP 2020, in line with the policy guidelines, the central government is recommending Balvatika or pre-primary sections in government primary schools. This allows for time and space for getting children 'school ready' and getting schools 'children ready' for starting their journey in the formal system.

The recent ASER 2022 report shows an increase in access to preschool education for 3- to 4-year-old children from 2018 to 2022. However, it also reflects that around one-third of the 5-year-old children are enrolled in age-inappropriate primary schools. Also, there are inter-state inequalities in access to (and type of) preschool education in India. Therefore, it suggests that the quality of preschools should be closely monitored to ensure that the

most disadvantaged children have access to high-quality preschool education programmes.

The recently released Centre Square Foundation (2023) report 'Building Strong Foundations: Examining Early Childhood Education in India' sheds light on early childhood education based on the U-DISE (2021–22) dataset. It highlights that around one-third of 3- and 4-year-olds children are not enrolled in any preschool programme. Among enrolled, around two-third of 3- and 4-year-olds children are enrolled in Anganwadi centres, followed by a smaller percentage opting for the private pre-primary schools such as 7.7 per cent of 3-year-olds and 18.1 per cent of 4-year-olds, and a negligible proportion is enrolled in Balvatikas in government schools, possibly due to limited accessibility. Also, it varies across states. However, the report also highlights that the choice of preschool education changes significantly for the 5-year-old children (only 5 per cent not enrolled) in which only around one-third of them remain in the Anganwadi centres while around a quarter of them opt for the private pre-primary school, and only 3 per cent enrolled in government school Balvatikas. Interestingly, the data also reflects that many children are not able to access the critical age-appropriate preschool education and prematurely enter formal education as around one-third of 5-year-olds are enrolled in classes I and II of primary schools.

In spite of these policies and access to preschool education in India, the evidence suggests that the children's early learning outcomes are poor and the majority of children lag behind in their school readiness levels (ASER Centre 2020). A large-scale longitudinal study 'India Early Childhood Education Impact Study' (IECEI) (Kaul et al., 2017) was conducted in rural areas of three Indian states (Rajasthan, Assam, and Telangana), with a sample of 14,000 children aged 4–8 years, to study the participation in preschools and primary schools across different institutions, early learning outcomes, and tracked their progress over time. The study highlights that more than 70 per cent of the 4-year-old children in the sample were attending preschools; around 7 per cent were in primary school while 18 per cent of them were not attending any formal educational institution. However, there were state wise differences in participation and access to the type of institution. For instance, around one-third of these sampled children from Rajasthan have not participated in any type of preschool and majority of the participants attended private preschool. In Assam, most of them attended the government-run AWCs. Also, a significant proportion of the sampled children from Rajasthan (12 per cent) and Telangana (8 per cent) were enrolled in age-inappropriate primary schools. In addition to this, it shows that around half of the 5-year-old children in Rajasthan and around 41 per cent in Telangana were attending primary schools, reflecting a low exposure of preschool education in these states as compared to Assam (6 per cent). Apart from the regional inequalities, there is also inequality in participation by type of institute as boys and children from

economically better-off families were more likely to attend private preschools and primary schools. The findings of the study also suggest that these institutions are not able to develop the children's early learning anywhere close to expected levels, and neither government nor private preschools follow the age-appropriate curricula and materials in their classrooms.

Majority of children access preschool education through AWCs, but the studies show that the AWCs focus is higher on its health and nutrition related services and not much on providing structured early childhood education (Rao and Kaul 2018; CSF Report 2023; Muralidharan 2023). The Anganwadi workers have multiple roles and responsibilities, and they struggle to complete the assigned work and activities in the available time (Kathuria et al. 2014). Even in one of better-off states like Tamil Nadu, an average Anganwadi worker spends less than 40 minutes a day on the children's preschool activities (Ganimian et al. 2024). Also, there are not many planned learning-based activities in AWCs, thus, children spent the majority of their time doing nothing and very less time spent on play-based and school readiness activities (IECEI Study 2017). Another major concern is the availability for special preschool teachers in schools with pre-primary sections, the recent UDISE (2021–22) data shows that only around one-third of schools, including government and private, have a special teacher for the pre-primary sections. A recent experimental study in Tamil Nadu by Ganimian et al. (2024) suggests a scalable and cost-effective way to increase the AWCs capacities to improve the children's preschool education through adding a locally hired second worker. The study finds that it doubled the instruction time for preschool activities and extra time left for the existing worker to focus on nutrition related activities which significantly improved their health outcomes.

In addition to this, a study by Dean and Jayachandran (2019) examines the impact of an RCT intervention via access to preschool education, on children's cognitive and socio-emotional development in rural Karnataka. The intervention was implemented by a private organisation called Hippocampus Learning Centres (HLC) in which two-year scholarships were given to children from low-income families to attend the kindergarten. The study found a significant improvement in cognitive development (0.8 SD) for those children who were part of the programme, and 40 per cent of the gains lasted during the first year of primary school. However, there was no significant impact on children's socio-emotional development. Another study by Dillon et al. (2017) examines the impact of a math game intervention, which is designed to develop children's intuitive numerical and spatial abilities, on children's learning in math. This intervention was implemented in 214 preschools, which are run by Pratham in urban slums of Delhi. Four months post intervention, a significant and lasting impact on children's developing numerical and spatial skills was observed. The intervention also subsequently boosted their learning of symbolic mathematics, and there was no impact in learning

of mathematics concepts and language. However, the study concludes that this type of intervention is inadequate for fostering children's subsequent learning of school mathematics, particularly that assessed at the end of the first year of primary schools in India.

All of this evidence indicates that the majority of children are not able to receive the quality preschool education and also highlights the issue of supply side constraints. The low early learning levels significantly hampers their further learning outcomes when they enter primary grades and the learning disparities amplify over time (World Bank 2018). Therefore, there is a need for equitable access to quality preschool education for all as it shapes a child's attitudes and perception towards education. The cost-effective preschool intervention programmes can be implemented which will provide a strong foundation and prepare children for their lifelong learning.

Pathways to Achieve Foundation Learning and Quality Education

Having reviewed available empirical literature and explored recent experiences in primary education in India, we can make three broad points.

First, while the field of education measurement is growing rapidly, with a great deal of student assessment happening at national, state and sub-state levels, simple-to-do and easy to understand data that is timely and can be useful for guiding instructional practice is still not easily available to teachers. Given the wide variations in children's learning even in primary grades, tools for guiding teaching-learning would have to start at the level of the children rather than being based on grade-level curricular expectations. Accordingly, teachers' instructional priorities and efforts should have the space to build from where the child is at today to where we want the child to be by the end of the year. Re-orienting assessment to be an integral part of classroom practice is an urgent need of the day if foundational literacy-numeracy goals have to be met by the beginning of class III.

A clear understanding of the learning situation is essential for designing pathways for solutions. For example, if the problem is seen as the fact that children are coming into class I unprepared cognitively or socially for formal schooling, then solutions for improving pre-primary schooling will be the obvious answer. Another example, if the challenge of learning is linked to the fact that curriculum is too difficult compared to where children are, then the solution will lie in designing and implementing 'catch up' initiatives. Tools that can be applied easily to a variety of ground level contexts and data that can be collected, analysed, and interpreted easily are urgently needed to build the path towards solutions.

Second, there are no ready-made 'silver bullets' for improving children's learning. Every intervention or strategy must be based on a theory of change that needs to be empirically tested (Banerji 2014). For example, the idea that

improving student outcomes through infrastructure or textbooks is backed neither by theory nor practice. Teacher incentives of different types have been implemented and studied. The available evidence suggests that teacher recognition, reward, and incentives could be potential ways to effectively improve student learning (Muralidharan et al. 2019). Finally, review and analysis of the empirical literature strongly suggests that interventions that are designed to change instructional practices in the classroom (such as targeted instruction, teaching-at-the-right level, structured pedagogy) have the highest chances of succeeding. But these need to be accompanied by alignment of system elements like (teacher training, materials, academic support and review) for achieving NIPUN goals.

Third, the NEP 2020 also lays out the promise and potential of early childhood education leading to better foundational learning in subsequent years. It is clear that for building strong foundations for learning, access to quality early childhood development and education programmes can play a major role. At the state level, recommendations of NEP 2020 are being translated into action. Different models are being tried. The impact of the regulating age of entry into class I has also been a major change in the school system. Investments that are currently being made by the different government departments need to be tracked and studied so that there can be course corrections for enabling better outcomes.

Broadly speaking, we need to track children's learning trajectories which can help in framing better policies emphasised on foundational learning outcomes to ensure that policy benefits are not wasted. The use of longitudinal data that follow children's progress and understand pathways can be very helpful at this stage of India's education development. Understanding the progression of learning from early childhood through later stages, policymakers can pinpoint critical intervention points and tailor programmes to address specific learning deficits. This approach ensures that policy efforts are not only targeted but also sustained over time, thereby maximising their impact.

In a previous article written by one of the authors, there was a discussion about whether there is a 'silver bullet' for improving children's learning. At that time and now, we reach the conclusion that 'there is no "silver bullet", but there are wars'. Further:

> [A]nd in wars there will be bullets. But it is not the bullet that wins the war. What wins the war is knowing who will fire, who to fire at, when to fire, and what to do next in what circumstances. Even if the bullets are the same, each war is different. Each time, the entire strategy has to be rethought and reworked. The war to improve learning has just begun. And as we fight the war, we will learn a lot that will take us to the next stage of our understanding of what can be done to help children learn better
>
> *(Banerji 2014)*

Notes

1 https://bice.org/app/uploads/2014/10/unesco_world_declaration_on_education_for_all_jomtien_thailand.pdf
2 NAS 2021 follows a separate sampling frame for each type of school management such as state government schools, government-aided schools, private-unaided recognised schools, and central government schools. Within each type of the sampled recognised schools, the targeted number of students per district per grade are decided independently for each grade 3, 5, 8, and 10. After this, 30 students are randomly selected for each grade in the sampled school by using the circular systematic sampling method based on classroom attendance register, while all the students are sampled if the enrolment in the targeted grade is less than 30. NAS 2021 was administered in 1,18,274 schools on around 3.4 million students across all states and union territories of India, while the NAS 2017 was administered in 1,10,000 schools on around 2.2 million students. Earlier, the NAS cycle 3 conducted survey for grades 3, 5, and 8 in different years from 2010 to 2013, and for grade 3 survey covered 104,374 students from 7,046 schools, grade 5 survey covered 150,101 students from 8,266 schools, and grade 8 covered 188,647 students from 6,722 schools. So, it reflects that NAS cycles over time have different sample size and follow different sampling methodologies.
3 In each district, 30 villages are randomly selected based on PPS method, meaning that larger villages with more households have a higher probability of being included in the sample. In each selected village, 20 households are randomly sampled, and then all children aged 5–16 years in these households are then assessed for their reading and arithmetic skills.
4 Please refer this link for ASER literacy and numeracy tests: https://v1.asercentre.org/p/141.html for reading assessment and https://v1.asercentre.org/p/142.html for the math assessment tool.
5 The measures proposed to improve the quality of elementary education include reform of the content and process of education, improvement in school buildings and other facilities, provision of additional teachers and the comprehensive programme of teacher education. Minimum levels of learning are to be laid down for each stage, which would naturally include laying down such norms for the primary and upper primary (NPE 1986; Programme of Action 1992): '5. (f) Since NPE lays down that children who complete a stage of education would have achieved certain prescribed skills and competencies, the emphasis will now shift from sheer enrolment to retention and quality of education' (p. 17).
6 One of the world's oldest programmes aiming to offer a comprehensive set of health, nutrition, and education related services to young children and to their mothers, and there are around 1.4 million operational Anganwadi centres across the country.

References

Afridi, F., Barooah, B. and Somanathan, R. 2018. 'Improving Learning Outcomes Through Information Provision: Experimental Evidence From Indian Villages', *Journal of Development Economics*, 146: 102276.
Akila, R. 2009. 'Mapping Educational Policy Structures and Processes in Tamil Nadu', *Education Policy Research Series*, 1(1).
ASER (Annual Status of Education Report). 2019. *Annual Status of Education Report 2018*. New Delhi: ASER Centre.
ASER (Annual Status of Education Report). 2020. *Annual Status of Education Report (Rural) 2019 'Early Years'*. New Delhi: ASER Centre.

ASER (Annual Status of Education Report). 2023. *Annual Status of Education Report 2022*. New Delhi: ASER Centre.

ASER Centre. 2016. *Middle Schools Study: Enrollment and Learning*. New Delhi: ASER Centre. http://img.asercentre.org/docs/Publications/ASER%20Reports/ASER%202016/aser2016fullreport.pdf

ASER Centre. 2018. *Study on Access, Transition and Learning in Secondary Education: A Two-block Study*. New Delhi: ASER Centre. https://img.asercentre.org/docs/Research%20and%20Assessments/Current/Education/Research%20Projects/studyonaccesstransitionandlearninginsecondaryeducationpolicybriefjanuary2018.pdf

Aslam, M., Rawal, S., Vignoles, A., Duraisamy, M. and Shanmugam, M. 2016. 'The Trajectory of Learning: The ABL Story in Tamil Nadu India', *Evaluation Report*, 2.

Banerjee, A. V., Banerji, R., Berry, J., Duflo, E., Kannan, H., Mukherji, S. and Walton, M. 2016. *Mainstreaming an Effective Intervention: Evidence From Randomized Evaluations of 'Teaching at the Right Level' in India. Working Paper Series No. 22746*. National Bureau of Economic Research (NBER).

Banerjee, A. V., Banerji, R., Duflo, E., Glennerster, R. and Khemani, S. 2010. 'Pitfalls of Participatory Programs: Evidence From a Randomized Evaluation in Education in India', *American Economic Journal: Economic Policy*, 2(1): 1–30.

Banerjee, A. V., Cole, S., Duflo, E. and Linden, L. 2007. 'Remedying Education: Evidence From Two Randomized Experiments in India. *The Quarterly Journal of Economics*, 122(3): 1235–1264.

Banerjee, A. V. et al. 2017. 'From Proof of Concept to Scalable Policies: Challenges and Solutions, with an Application', *Journal of Economic Perspectives*, 31(4): 73–102.

Banerji, R. 2014. Searching for the 'silver bullet': What works in improving children's learning outcomes?. *Notes*. https://www.ideasforindia.in/topics/macroeconomics/searching-for-the-silver-bullet-what-works-in-improving-childrens-learning-outcomes.html.

Bardhan, P. and Mookherjee, D. 2005. *Decentralization, Corruption and Government Accountability: An Overview*, Boston University, Department of Economics, The Institute for Economic Development Working Papers Series dp-152, Boston University, Department of Economics.

Beg, S., Fitzpatrick, A., Kerwin, J., Lucas, A. M., & Rahman, K. W. 2023. Teacher flexibility and school productivity: remedial secondary education in India. *Working Paper*. Poverty Action Lab. USA. https://www. povertyactionlab. org/sites/default/files/research-paper/wp5761_Teacher-Flexibility-and-School-Productivity_India_Jan2023. pdf.

Bhattacharjea, Suman, Wadhwa, Wilima and Banerji, Rukmini. 2011. *Inside Primary Schools: A Study of Teaching and Learning in Rural India*. New Delhi: ASER.

Centre Square Foundation. 2023. *Building Strong Foundations: Examining Early Childhood Education in India*. https://www.centralsquarefoundation.org/Building-Strong-Foundations_Full-Report_CSF-2023.pdf

De Barros, A., Fajardo-Gonzalez, J., Glewwe, P. and Sankar, A. 2022. 'Large-Scale Efforts to Improve Teaching and Child Learning: Experimental Evidence from India', *Journal of Development Economics (Conditionally Accepted via Pre-Results Review)*. https://www.povertyactionlab.org/sites/default/files/research-paper/de%20Barros%20et%20al.%20-%202022%20-%20Large-Scale%20Efforts%20to%20Improve%20Teaching%20and%20Child%20Learning.pdf

Dean, J. T. and Jayachandran, S. 2019. *Attending Kindergarten Improves Cognitive but not Socioemotional Development in India*. Cambridge: Poverty Action Lab.

Dillon, M. R., Kannan, H., Dean, J. T., Spelke, E. S. and Duflo, E. 2017. 'Cognitive Science in the Field: A Preschool Intervention Durably Enhances Intuitive but not Formal Mathematics', *Science*, 357(6346): 47–55.

Duflo, E., Hanna, R. and Ryan, S. P. 2012. 'Incentives Work: Getting Teachers to Come to School', *American Economic Review*, 102(4): 1241–1278.
Evans, D. K. and Popova, A. 2016. 'What Really Works to Improve Learning in Developing Countries? An Analysis of Divergent Findings in Systematic Reviews', *The World Bank Research Observer*, 31(2): 242–270.
Fink, G. and Rockers, P. C. 2014. 'Childhood Growth, Schooling, and Cognitive Development: Further Evidence from the Young Lives Study', *The American Journal of Clinical Nutrition*, 100(1): 182–188.
Ganimian, A. J., Muralidharan, K. and Walters, C. R. 2024. 'Augmenting State Capacity for Child Development: Experimental Evidence From India', *Journal of Political Economy*, 132(5): 1565–1602.
Global Education Evidence Advisory Panel (GEEAP). 2023. *Cost-Effective Approaches to Improve Global Learning*. London, Washington, DC, New York: FCDO, the World Bank, UNICEF, and USAID.
Government of India. 1990. *Minimum Levels of Learning at Primary Stage*. Ministry of Education, Ministry of Human Resource Development.
Government of India. 1992. *Programme of Action 1992: National Policy on Education 1986*. Department of Education, Ministry of Human Resource Development. https://archive.org/details/dli.ernet.15550
Government of India. 2020. *National Educational Policy*. Ministry of Human Resource Development, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
Government of India. 2021. *National Initiative for Proficiency in Reading with Understanding and Numeracy (NIPUN Bharat) Guidelines*. Department of School Education and Literacy, Ministry of Education. https://dsel.education.gov.in/sites/default/files/NIPUN_BHARAT_GUIDELINES_EN.pdf
Government of India. 2022a. *Foundational Learning Study (FLS) 2022: Benchmarking for ORF and Numeracy*. NCERT, Department of School Education & Literacy, Ministry of Education, Government of India. https://nipunbharat.education.gov.in/fls/RCard.aspx
Government of India. 2022b. *National Achievement Survey 2021: National Report*. National Council of Educational Research and Training, Ministry of Education. https://nas.education.gov.in
Government of India. *National Policy on Education 1986 (As Modified in 1992)*. Ministry of Human Resource Development, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/document-reports/NPE86-mod92.pdf
Gowda, K., Kochar, A., Nagabhushana, C. and Raghunathan, N. 2013. *Curriculum Change and Early Learning: An Evaluation of an Activity Based Learning Program in Karnataka, India. Working Paper No. 475*. Stanford Center for International Development.
He, F., Linden, L. L. and MacLeod, M. 2009. 'A Better Way to Teach Children to Read? Evidence From a Randomized Controlled Trial'. Unpublished manuscript, New York: Columbia University.
Kathuria, A. K., Orbach, E. and Anand, D. 2014. *Institutional Arrangements for Nutrition in India: An Assessment of Capacity*. Washington: World Bank.
Kaul, V., Bhattacharjea, S., Chaudhary, A. B., Ramanujan, P., Banerji, M. and Nanda, M. 2017. *The India Early Childhood Education Impact Study*, pp. 1–186. New Delhi: UNICEF.
Kremer, M., Brannen, C. and Glennerster, R. 2013. 'The Challenge of Education and Learning in the Developing World', *Science*, 340(6130): 297–300.
Linden, L. L. 2008. *Complement or Substitute? The Effect of Technology on Student Achievement in India. Working Paper*. Columbia University, InfoDev.
López Boo, F. 2016. 'Socio-Economic Status and Early Childhood Cognitive Skills: A Mediation Analysis Using the Young Lives Panel', *International Journal of Behavioral Development*, 40(6): 500–508.

Muralidharan, K. 2023. *Accelerating India's Development: A State-Led Roadmap for Effective Governance*. New Delhi: Penguin Random House India Pvt. Limited.

Muralidharan, K., Singh, A. and Ganimian, A. J. 2019. 'Disrupting Education? Experimental Evidence on Technology-Aided Instruction in India', *American Economic Review*, 109(4): 1426–1460.

Muralidharan, K. and Sundararaman, V. 2010. 'The Impact of Diagnostic Feedback to Teachers on Student Learning: Experimental Evidence From India', *The Economic Journal*, 120(546): F187–F203.

Muralidharan, K. and Sundararaman, V. 2011. 'Teacher Performance Pay: Experimental Evidence From India', *Journal of Political Economy*, 119(1): 39–77.

Muralidharan, K. and Sundararaman, V. 2013. *Contract Teachers: Experimental Evidence From India. Working Paper No. 19440*. National Bureau of Economic Research (NBER).

National Council of Educational Research and Training. 1998. *Sixth Survey of Educational Research: 1993–2000*. New Delhi: NCERT.

National Council of Educational Research and Training. 2005. *National Curriculum Framework*. http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf

National Council of Educational Research and Training. 2023. *National Curriculum Framework*. https://www.education.gov.in/sites/upload_files/mhrd/files/ncf_2023.pdf

National Institute of Educational Planning and Administration. 2006. *DISE Flash Statistics: 2005–06. District Information System for Education (DISE)*. New Delhi: NIEPA.

National Institute of Educational Planning and Administration. 2016. *DISE Flash Statistics: 2015–16. District Information System for Education (DISE)*. New Delhi: NIEPA.

Nyqvist, M. B. and Guariso, A. 2021. 'Supporting Learning in and Out of School: Experimental Evidence From India'. MSc, Stockholm School of Economics.

Pandey, P. 2023. 'Does Information Improve Service Delivery? A Randomized Trial in Education in India', *PLoS ONE*, 18(3): e0280803.

Pandey, P., Goyal, S. and Sundararaman, V. 2009. 'Community Participation in Public Schools: Impact of Information Campaigns in Three Indian States', *Education Economics*, 17(3): 355–375.

Parvez, A. 2023. 'Inside Mathematics Learning Inequality: An Analysis of Young Lives Survey Sata, India', *Oxford Review of Education*, 50(2): 232–248.

Pillai, M. and Ramaswamy, R. 2010. *Qualitative Studies of Selected Educational Initiatives in South Indian States (Karnataka, Tamil Nadu, Andhra Pradesh)-Revisiting Education For All*. New Delhi: Institute of Social Studies Trust.

PROBE Team. 1999. *Public Report on Basic Education in India*. New Delhi: Oxford University Press.

Raj, S. R., Sen, K., Annigeri, V. B., Kulkarni, A. K. and Revankar, D. R. 2015. 'Joyful Learning? The Effects of a School Intervention on Learning Outcomes in Karnataka', *International Journal of Educational Development*, 40: 183–195.

Rao, N. and Kaul, V. 2018. 'India's Integrated Child Development Services Scheme: Challenges for Scaling Up', *Child: Care, Health and Development*, 44(1): 31–40.

Sadgopal, A. 2004. *Globalisation: Demystifying Its Knowledge Agenda for India's Education Policy. Durgabhai Deshmukh Memorial Lecture*. New Delhi: The Council for Social Development and India International Centre.

Singh, R. and Mukherjee, P. 2018. 'Effect of Preschool Education on Cognitive Achievement and Subjective Wellbeing at Age 12: Evidence From India', *Compare: A Journal of Comparative and International Education*, 49(5): 1–19.

UNICEF (2016). *Review of Continuous and Comprehensive Evaluation (CCE) in six Indian states* [Unpublished evaluation report].
World Bank. 2003. *World Development Report 2004: Making Services Work for Poor People*. Washington, DC: The World Bank. https://hdl.handle.net/10986/5986
World Bank. 2018. *World Development Report 2018: Learning to Realize Education's Promise*. Washington, DC: The World Bank. https://www.worldbank.org/en/publication/wdr2018