2018

A Lesson in Learning: Improving Learning Outcomes in India Via Pedagogical Innovation

Rhea Handa
Scripps College

Recommended Citation
http://scholarship.claremont.edu/scripps_theses/1105

This Open Access Senior Thesis is brought to you for free and open access by the Scripps Student Scholarship at Scholarship @ Claremont. It has been accepted for inclusion in Scripps Senior Theses by an authorized administrator of Scholarship @ Claremont. For more information, please contact scholarship@cuc.claremont.edu.
A LESSON IN LEARNING:
IMPROVING LEARNING OUTCOMES IN INDIA VIA PEDAGOGICAL INNOVATION

by
RHEA HANNA

SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILMENT OF THE DEGREE OF BACHELOR OF ARTS

PROFESSOR NAYANA BOSE
PROFESSOR NANCY NEIMAN AUERBACH

December 8, 2017
# Table of Contents

Table of Contents .................................................................................................................. 2
Abstract .................................................................................................................................. 3
Acknowledgements ................................................................................................................ 4
Introduction ............................................................................................................................. 5
Policy Overview ..................................................................................................................... 7
Literature Review .................................................................................................................. 11
Objectives as Educational Outcomes .................................................................................. 11
  Attendance ......................................................................................................................... 13
  Learning Outcomes ........................................................................................................... 14
Life and Societal Benefits as Educational Outcomes ......................................................... 17
  Health ................................................................................................................................. 17
  Labor Market Outcomes and Productivity ....................................................................... 19
  Intergenerational Outcomes ............................................................................................. 20
Teaching at the Right Level: An Overview ......................................................................... 22
Data and Model .................................................................................................................... 26
Data Sources ......................................................................................................................... 27
Summary Statistics ............................................................................................................... 28
Model .................................................................................................................................... 32
Results .................................................................................................................................... 33
Issues ...................................................................................................................................... 36
Case Study: Vasant and Nancy ............................................................................................ 37
Conclusion .............................................................................................................................. 39
Appendix: Pratham Assessment Tools ............................................................................... 43
Bibliography .......................................................................................................................... 45
Abstract

When delivered well, education is key to addressing a host of individual and societal ills, from poverty and disease to crime and poor voter engagement. India has demonstrated considerable progress in improving various aspects of its primary education system, including infrastructure and buildings, teacher-student ratios, and school enrollment. However, student learning outcomes remain consistently low across the country. A review of the literature surrounding learning outcomes has highlighted gaps in school instruction and has shown the dire need for innovations in pedagogy and curriculum to improve student learning. This paper assesses the long-term impact of one such pedagogy, called Teaching at the Right Level (or TaRL), in the districts of five states of India via an ordered probit model and linear regressions. The quantitative model shows a positive and significant effect of TaRL exposure on learning levels and income, as hypothesized throughout this paper. Additionally, case studies of two students exposed to TaRL are explored to illustrate individual effects of the pedagogy.

Keywords: education, India, Pratham, enrollment, attendance, learning outcomes, pedagogy, Right to Education, RTE, TaRL, economic development
Acknowledgements

I am deeply thankful for the support and encouragement of my phenomenal readers. I would like to thank Professor Bose for her patience, for providing me with advice and encouragement over the course of the semester, and for nurturing my growing interest and love for education and development economics over the last two years. I also want to thank Professor Neiman Auerbach, who was one of the first professors I ever had the pleasure of taking a Politics class with in college and who introduced me to political economy; she has offered invaluable advice, comments, and confidence over the semester. I also want to thank Professor Roberto Pedace for his guidance in the thesis-writing process, and for bringing his lovely puppy Lola to office hours.

Thank you to Pratham, Rukmini Banerjee, and Devyani Pershad for giving me the incredible opportunity to work with them this summer. Going into the field and actually meeting the women and children that Pratham’s programs impact has only reaffirmed my belief in the power of education to change lives. Thank you for all the incredible work you do.

I am also so grateful for the unconditional support and love of my family, I (literally) would not be here without you. Thank you, Anya, for always pushing me, and for the many, many edits. A special thank you goes to my mom, Meenu, who has given me everything I have and inspires me to do better every day. To my dog, Scout, coming home to you is what I have been looking forward to throughout the time I spent writing my thesis.

To Akhil, thank you for always letting me vent to you and for being a constant pillar of support and love. To my lovely friends, thank you for all the good times and Motley gatherings.

Most of all, to the millions of students in India like Vasant and Nancy, thank you for bringing hope, love, and light into the world. This is for you.
Introduction

Across the globe, millions\(^1\) of children leave school without the ability to read, write, or do basic arithmetic. As a result, many are unable to, say, calculate change from a monetary transaction, or read a doctor’s prescription or a legal document, or even interpret a political debate, let alone build a career or earn a livable income.\(^2\) When delivered well, education is key to addressing a host of individual and societal ills. For individuals, it enables them to be employed and to earn higher wages by increasing their productivity; to be healthier, as they are better informed to prevent disease and to use health services available to them effectively; and to pull themselves out of poverty by improving intergenerational outcomes. For societies, it encourages innovation, increases the overall productivity of the labor force, strengthens existing institutions while spurring ideas for new ones, lowers crime rates, and gives way to more informed voters that are better equipped to actively engage in policymaking. Schooling without learning is a waste of resources and is an injustice to students who seek schooling in order to learn. Education *must* equip students with the skills they need to lead healthy, productive, meaningful lives; however, in India, this is

---


not the case – of the 250 million children worldwide who cannot read or write, two-fifths reside in India,\(^3\) despite a primary school enrollment rate of 92.26\%\(^4\).

To ensure that students are receiving the quality education they deserve, it is imperative that governments and policymakers focus on interventions that benefit learning; this includes ensuring enrollment, attendance, teacher training, and student engagement through curricula. However, students are only likely to learn higher-order skills if they can grasp the basics – reading and math. This paper contributes to the literature surrounding learning outcomes by testing a program in India that strives to do just that – equip students with basic reading and math skills by using an innovative pedagogy that groups students by their learning levels rather than grade levels. I will contribute to the literature surrounding educational outcomes by evaluating the long-term impact of this program. To do so, I will first evaluate the problems and issues within India’s education system that allow students to fall behind. Second, I will review the literature surrounding educational outcomes that range from enrollment to intergenerational mobility. Finally, I will explore the learning-level pedagogy and its program implementation, and will use a comparative quantitative model to test whether the

\(^3\) Pratham Education Foundation: [http://prathamusa.org/flipbook/?assetId=3191](http://prathamusa.org/flipbook/?assetId=3191)

program has had long-term impacts in India. In addition to the quantitative model, I will use qualitative case studies of two students to convey the effectiveness and importance of this program.

**Policy Overview**

Primary education was made a fundamental right by the Government of India in 2009, through the Right of Children to Free and Compulsory Education Act of 2009 (RTE Act). The Act stipulates that no child shall be liable to pay any kind of fee which may prevent him or her from pursuing and completing elementary education, and casts an obligation on the appropriate government authority to provide and ensure completion of elementary education by all children in the 6-14 age group. Before the Right to Education was passed, India’s flagship program for universalization of primary education was the Sarva Shiksha Abhiyan (SSA) introduced in 2001. With the passing of the Act, SSA finally found legal backing for its implementation and has become the primary vehicle for carrying out the goals stated in the RTE Act. The aim of SSA included opening institutions in areas devoid of schools and other facilities, fortifying existing school infrastructures with additional classrooms, ensuring hygienic sanitary facilities and aiding with financial grants. SSA also aimed to provide existing schools that have inadequate teacher strength with extensive training, study materials, additional teachers, and academic support at a cluster, block and district level. SSA continues to be an important policy for primary
education even today and has been instrumental, along with fee waivers through the RTE Act, in increasing school enrollment as outlined below.

In recent years India has made significant improvements in the provision of, and improved access to, education. According to UNESCO, net enrollment in India was 92.26% in 2013, with female enrollment rates of 92.92%. Despite improvements, however, other statistics are bleak. Even though policy measures within the Act appear to be promising, poor implementation has resulted in low-quality schooling. According to the Annual Status of Education 2016 Report, 73% of eighth graders in rural India can read a fifth-grade level text but not any higher. Similarly, 43% of eighth graders can divide numbers, but cannot perform other higher-order math operations. These statistics clearly show that students who are unable to grasp critical competencies in reading and math are ill-prepared for instruction in their current grade. It has become clear that mere declaration of a right does not amount to on-the-ground change.

These low student performance numbers are a result of systemic drawbacks of the RTE Act itself. Dubey (2010) identified six key challenges in the implementation of the RTE Act. First, many students across India do not have access to school education despite high enrollment rates. Since the Act itself is ambiguous with respect to a specific date for the achievement of universalization, it allows government agencies to dodge responsibility.
The second and most significant issue is the quality of schooling and low learning levels. Poor quality can be attributed to various factors, including poor curriculum and syllabus, deficient pedagogy, negligent or under-trained teachers, and gross underfunding. With pressure to complete the syllabus within a year, teachers are often forced to concentrate their efforts on the students that are already at the top of the class (Banerji (2016)). With no room for personalized attention, students in the bottom percentiles are often ignored and do not get the guidance they need; and with no mention of qualitative norms and standards in the Act itself, it is hard to quantify teaching goals.

Third, primary education is extremely underfunded. Government expenditure per student on primary education in India is only 9.76% of GDP per capita (World Bank). As a share of GDP, total government expenditure on education was as low as 3.8% in 2013, and of total government expenditure on education, only 28.4% accounts for primary education in 2013 (World Bank). This is compared to 5.38% of GDP spent by the United States on education in 2014, and 19.92% of GDP per capita spent per student on primary education (World Bank).

The fourth issue is educational inequities and discrimination. Class divisions in Indian society are carried over to the education system. Children of the rich and elite have access to good quality private schools, and children of the poor and other marginalized groups may only have access to low-quality private and public schools. While the Act
specifies a minimum 25% reservation for underprivileged children in private schools, schools are rarely held accountable to this standard. For example, a seven-year-old student named Bilaal in Mumbai, who received admission to a private school via the 25% quota, was asked to pay ₹2000 ($30) for books and uniform in order to take his final exams. Because the family could not afford this fee payment, Bilaal was not allowed to take his exams. His father filed a complaint with the local education authority, but no action has been taken so far.5

Fifth, Dubey explains, a persistent problem within the system is that often, education is mistaken for literacy. Education has often been defined in functional terms; that is, school education is merely for imparting skills of literacy and numeracy. Further, even these skills are often not provided effectively, causing students to fall behind.

Finally, one of the biggest challenges has been the lack of accountability. The Act did not create a mechanism vested with the overall responsibility of overseeing progress or redressing grievances, allowing local authorities and schools to skimp on the Act’s implementation, such as in the case of Bilaal’s complaint above, which has led to many of the problems highlighted in this overview.

---

Therefore, the RTE Act, while successful in enrolling and retaining students, has fallen short of providing students with positive educational outcomes, because it does not provide students with the skills they need for their future lives as productive members of the workforce, or even as adult citizens and parents.

**Literature Review**

In order to assess the long-term impact of pedagogical innovation on educational outcomes, it is important to explore what educational outcomes can mean in the developing world from an institutional and individual perspective. For the purpose of this paper, educational outcomes may be defined as a goal or standard reached by a student in the process of getting or being educated. Educational outcomes can be separated into two categories – one, an objective or standard in education policy that is measured in terms of enrollment, attendance, and attainment/learning outcomes; and two, as life or societal outcomes, whether in the form of long-term health outcomes, labor market outcomes, or intergenerational mobility.

**Objectives as Educational Outcomes**

**Enrollment**

Policies with respect to enrollment and learning outcomes have focused on a basic principle – once students are enrolled in school, they will gain foundational competencies related to learning, including reading and
math. Studies have found that “households will invest in an additional year of education for their child only if the present discounted value of the expected increase in benefits exceeds the costs of doing so” (Glewwe and Muralidharan (2015)). For this reason, there has been a consistent focus on increasing enrollment in schools through lowering the cost of schooling in the Global South, causing enrollment rates to skyrocket around the world – gross enrollment rates in all regions were over 100% in 2008 (Glewwe et al. (2008)). It is natural to think that bringing children into school will increase student achievement and learning, however, this impact may only be limited to students who were not enrolled in school previously (Glewwe et al. (2011)). The assumption is that by stimulating the demand for education, enrollment will increase and consequentially so will learning and educational attainment (Hanushek and Woessmann (2008)). However, research has shown that simply getting students to school is not enough to make sure that they are actually learning. Hanushek and Woessmann, through a study of demand-side programs such as conditional cash transfers, school nutrition/meal-provision programs, and fee reductions, have shown that the high enrollment induced by these programs was not necessarily accompanied by increased student achievement, rather, it may have had negative effects on students who were previously enrolled, because per-pupil resources may fall.
Additionally, spending on infrastructure, buildings, and amenities to attract and increase enrollment, while important, has shown a limited impact on learning. Rather, while these investments make schools more appealing to teachers and students, they have no impact on the teaching and learning process, which may be the main determinant of learning (Muralidharan (2013)).

**Attendance**

In practice, while enrollment rates might be high, attendance rates still tend to be low. This is particularly true in countries and regions where there is pressure on schools to show high enrollment rates in response to budget allocation rules and/or compulsory schooling laws, such as in India (Glewwe and Muralidharan (2015)). Students do not learn as a result of enrollment; rather, they learn as a result of going to school and attending class on a regular basis. The prevalence of low attendance, as well as high repetition and desertion rates, despite low costs of schooling, is often attributed to opportunity cost in terms of forgone labor on the farm or in the household. Particularly in rural areas, opportunity cost can be high for primary school students; and attendance will suffer when parents believe that the return to time spent in school does not justify the loss of additional labor. This, in turn, increases the chances of students failing, repeating grades, and eventually dropping-out (Bedi and Marshall (1999)). More often than not, according to Bedi and Marshall, this is a result of low school
quality, as it affects this cost-benefit analysis; if students are receiving a quality education, going to school is worth their time. In a study of rural Honduras, Bedi and Marshall find that investment in school quality may be used to achieve the same objective as programs that are focused on reducing the opportunity cost associated with primary schooling. Further, they also find that the achievement gains from increased attendance themselves motivate students to come to school regularly; that is, when a student does well in a test or gets promoted to the next grade, he/she is more likely to attend school regularly going forward. This finding is significant because it shows a two-way relationship between learning and attendance – not only does attending school promote learning, but learning also bolsters regular attendance.

**Learning Outcomes**

From the review above, one sees that ultimately, student learning and achievement is what incentivizes students and their parents to invest in an education, that is, student learning makes parents and students more likely to enroll in and regularly attend school. A learning outcome may be measured in the form of a particular educational standard a student must achieve, whether in the form of test scores or graduation and completion rates. A learning/instructional outcome may also be in the form of skills, whether vocational or foundational, such as reading, arithmetic or writing. Together, enrollment, attendance, and learning accurately represent a positive educational outcome. The
question, then, is what affects learning? Enrollment and attendance together are obviously some of the factors. But once students are enrolled in school and are present in class, what facilitates learning?

One of the major factors affecting learning is teacher attendance. Being present in the classroom is an essential condition for teachers to exert efforts at teaching. In a study in India, Kremer et al. (2005) find that a 10% increase in teacher absence is associated with 1.8% lower student attendance, as well as with a 0.02 standard deviation reduction in student test scores. This finding impacts perspectives on learning and absence in two ways. One, a student may decide that it is not worth coming to school if there will be no teacher to teach. From the above, we know that if a student is not attending school regularly, he/she is less likely to learn anything; and conversely, if a student is not learning anything, he/she is less likely to attend school in the future, therefore learning less in the long-run. Further, in a study of Sub-Saharan Africa, Bold et al. (2017) showed that teachers, even when they are in class, teach too little, and also lack the necessary skills and knowledge to teach effectively. Teacher absence can be reduced in two ways – monitoring, and financial incentives. Banerjee and Duflo (2006) show that a combination of the two is especially effective. In a program in Udaipur, India, where teacher attendance was monitored daily through cameras, and teachers were given financial bonuses for regular attendance, the absence rate of teachers was cut in half – from 36% to
18% over one school year. Conversely, teacher absence can also be addressed by incentivizing student learning (Banerjee and Duflo (2006)). In a program run by ICS Africa, it was announced that the highest scoring 15% of girls in grade 6 would receive a scholarship at the end of the school year. In the schools with the scholarship program, both teacher and student attendance rose. This is because students and parents were more likely to hold their teachers accountable, and teachers were more likely to teach a class of keen students who are eager to learn. Additionally, a positive externality of high teacher attendance was that it raised the attendance of boys as well, even though they were ineligible for the scholarship, because having a teacher in class and teaching benefits and incentivizes an entire classroom, not just a handful of students.

However, if having a teacher in the classroom has still not caused a rise in learning levels, then there is clearly a gap in the provision of a quality education. Teachers in many developing countries, like India, are expected and required to teach a very demanding curriculum within a short amount of time and without any teaching instructions, thereby limiting the flexibility of teaching practices (Muralidharan (2016)). Further, Banerjee et al. (2016) have shown that low learning levels may also be due to ineffective teaching strategies. According to the authors, providing guides on what teachers should teach and how they should teach it can result in large gains in learning outcomes, particularly for
low-performing students. For instance, reorganizing the classroom to assess students and responding to those assessments by restructuring instruction based on students’ actual learning levels can cause large gains in instructional/learning outcomes. This pedagogy, called TaRL or Teaching at the Right Level, is implemented by an organization in India called Pratham as a remedial program through ‘learning camps’ outside of school. Nearly all of the students who attended the camps in 2005-2006 advanced one level (for example, students went from reading nothing to reading letters) over the course of the academic year (Banerjee et al. (2010)). These findings show that curriculum, teaching materials, and teaching strategies impact how teachers teach, and how students learn and absorb. Identifying effective methodologies and assessing their impact over time is key to expanding successful programs such as TaRL for the future.

Life and Societal Benefits as Educational Outcomes

**Health**

In the literature surrounding health and education, there is little agreement on the exact causal relationship between the two. However, what health economists have settled on is that a child’s health impacts his/her education, and an adult’s education is instrumental in his/her future health decisions (Vogl (2012)). Students in poor health are almost certainly going to miss more days of school due to illness than their
healthy peers, and may also learn less while they are in school, since poor health may impact the physical and mental capacity required to learn (Grossman (2015)). For example, a study of a deworming program in Kenya showed a 7.5% gain in primary school participation in treatment schools, reducing student absenteeism by one quarter, and was far cheaper than alternative methods of boosting school participation and essential medical service provision (Miguel and Kremer (2004)). Miguel and Kremer’s study highlights the important relationship between vaccinations, vital medications, and schooling – students that are immunized or treated for diseases that lower their ability to learn, such as worms, are more likely to do better in school.

The expectation of good adult health also increases schooling investments in childhood, as returns are to be expected for a longer period of time (Vogl (2012)). In the long-run, education should improve an individual’s efficiency in the consumption of health and medical services, that is, education should enable people to make better health decisions, whether in choice of hospital or doctor, or even the choice to adopt healthier habits (Leigh (1983)). In the case of girls’ education, health, and fertility, a study by Duflo et al. (2014) has shown that reducing the cost of education by providing free uniforms reduces school drop-outs, teen childbearing, and early marriage. These findings suggest that health is important not just as a future or societal
outcome, but also because it affects how and if students learn, thereby affecting learning outcomes as well.

**Labor Market Outcomes and Productivity**

In traditional neo-classical growth theory, human capital is said to be one of the greatest explanatory factors for economic growth since it improves the quality of the labor force and increases its productivity; that is, education produces human capital, and thereby also produces economic growth (Mankiw (1995)). A study by Ali (1985) showed that a unit increase in the adult literacy rate raises the annual growth of labor productivity by 0.04 percentage points. Therefore, as labor productivity increases, as does the probability of employability, because employers seek increasingly productive workers. This is because if workers are educated they are better able to work cooperatively and precisely and to adapt to new technologies (Mankiw (1995)). Educational attainment and years of schooling, then, directly affect an individual’s occupational status, including “one’s initial level of entry, and subsequent stability of attachment to the labor market,” and also decreases the probability of unemployment as the number of years of education increase (Edgerton et al. (2012)). Additionally, there is also a parental effect of labor force participation on child education. Afridi et al. (2012) have shown that increased participation of mothers in the workforce results in more time spent in school by their children. Afridi et al. also showed that this increase in school participation is reflected in higher grade attainment.
of children; that is, learning levels are higher for students whose mothers are actively engaged in an occupation or job, because of the trade-offs between the costs of childcare and the costs of school. For a society, education exercises an impact on the ability to catch up technologically and facilitates the ability of a nation to adapt to and adopt new technologies (Hua (2005)), thereby creating a more productive labor force overall.

**Intergenerational Outcomes**

In the long-run, education (formal and informal schooling, skills training, and knowledge acquisition) can also be a means of escaping poverty in its broadest sense. Knowledge and skills, along with formal qualifications, can facilitate upward economic and social mobility (Harper et al. (2003)). As seen above, not only does education offer the means to get a better-paying job and be healthy, but it also allows individuals to perform basic functions, such as reading an instructions label, or keeping accounts to manage money, which may raise overall wellbeing. On an intergenerational level, educated parents are more likely to educate their children because they understand the potential benefits of an education (Harper et al. (2003)). Thus, over time, as future generations reach higher levels of schooling and education (which in itself is a positive intergenerational outcome), they are likely to earn higher incomes than the generation before theirs, eventually
succeeding in pulling themselves and their families out of poverty, thus creating a positive intergenerational outcome.

Overall, the existing literature on outcomes has shown that learning is at the center of creating positive educational outcomes. While raising enrollment and attendance is crucial to improving learning and achievement, the improved learning itself is an immense motivator for students to enroll in and attend school. Further, as learning outcomes improve, so do positive life outcomes. Increased achievement leads to better health in the future, higher incomes in the future, as well as to intergenerational wellbeing and economic and social mobility. However, achieving these improved learning outcomes has proved difficult, particularly in India, where there are pervasive issues of quality in the current education system. Efficiently reorganizing classroom instruction has been suggested as a means of improving outcomes (Banerjee et al. (2016), Banerjee et al. (2010)) for reading and math competencies in a primary school classroom. While there have been short-term impact evaluations of these programs, there is very little to no evidence of the impact these programs have had on learning over time. I hypothesize that students in districts that have been exposed to learning level-based classroom strategies have better learning outcomes over time than students in districts that have not been exposed. This paper adds to this body of literature in economics by addressing the
gap on long-term outcomes in the literature, by using Pratham’s Read India program that incorporates TaRL to test this hypothesis.

**Teaching at the Right Level: An Overview**

TaRL differs from traditional teaching approaches in five ways. First, learning goals are clearly articulated in the beginning so that teachers, students, and parents are on the same page. Second, simple assessments are conducted at the beginning of each learning camp cycle.\(^6\) This is so instructors are aware of the level of each individual child, and this baseline data is also used to group students appropriately by learning levels. Similar assessments are used later in the program to track progress and to ‘graduate’ students to the next level-based group. Third, unlike traditional approaches, students are grouped according to their learning-level, and not by age or grade. For reading, these levels range from beginner (those who cannot identify letters), to those who can recognize letters, then words, then paragraphs, and finally, those who can read stories.\(^7\) For arithmetic, the levels range from number recognition to operations, namely, addition, subtraction, multiplication, and lastly, division.\(^8\) This ensures that teaching and learning are tailored to each student’s competency in reading and math. Fourth, TaRL is used in conjunction with Pratham’s

---

\(^6\) Appendix 1

\(^7\) Ibid.

\(^8\) Ibid.
Combined Activities for Maximized Learning pedagogy, or CAMaL, which relies on a set of daily activities ranging from the use of pictures and straws to singing. Children will perform tasks that require them to listen, speak, do, read and write, allowing better retention and outcomes. This requires students to engage with learning materials meaningfully and learn in an application-based environment. Fifth, Pratham’s programs that use TaRL usually employ volunteers and part-time teachers to teach remedial classes in summer camps or after-school classes. Therefore, they are extremely cost-effective and require very little capital; and are created to supplement a more traditional teaching method or institution as a remedial program.

TaRL, seeks to address three key approaches to education and learning at a more individual level. First, it makes learning a serious goal for its stakeholders. Once students and parents are invested, they are more likely to expect and work towards returns. Second, it regularly collects and acts on data. Using the baseline and any subsequent assessments, volunteers are able to regularly tailor instruction to each group and to each student. Third, the program was created to be focused on learning. While the initial stages of the intervention focus on mobilization and enrollment of students, families, volunteers, etc., the main goal is to improve learning outcomes for students and to give them the tools to succeed in mainstream educational institutions.
Pratham’s Teaching at the Right Level approach has been tested by various researchers since its inception. Monitoring and evaluation studies by Pratham itself have found that in a group of 143,583 students, the percentage of children that could not read even a word decreased from 60% in the baseline assessment to 9% in the end-line assessment.9 Further, 77% of students who could only read letters baseline became readers at the end of the camps.10 Outside of Pratham, Banerjee et al. (2010) evaluated Pratham’s Read India program through a randomized controlled trial. By the end of the program, all the participating students who could not read before the start of the program could at least read letters. In contrast, only 40% students in the control/comparison villages could read letters by the end of the year. According to the authors, those who could read only letters at the beginning were 26% more likely to read a short story if they had participated than if they had not (Banerjee et al. (2010)). Banerjee and Duflo (2011) also found that besides allowing for large gains in reading and math, it takes very little training to be a good teacher for TaRL programs. The volunteers who had such dramatic effects were mostly college students and other people with a week or ten days of training in pedagogy. This indicates that very little is required to create a large difference in learning outcomes.

9 Pratham Education Foundation: http://prathamusa.org/flipbook/?assetId=3191
10 Ibid.
Pratham’s programs have also been evaluated for scalability and integration into the government school system. Banerjee et. al (2016) ran a randomized controlled trial in two states of India to test TaRL in public school classrooms. They tested two models - in one, public school teachers in the state of Haryana were trained by Pratham to implement the program and were given Pratham materials to do so. They were allotted a specific time of day to reorganize the classroom by learning level. In the other model, Pratham volunteers were integrated into the classroom to run the program in Uttar Pradesh public schools during a designated timeframe. The authors found that both models lead to significant gains in learning. In Uttar Pradesh, the number of children who can read at a second-grade level increased from 14% to 24%, and from 34% to 47% in Haryana. Following this report, Pratham has devised blueprints to scale interventions to include more government partnerships, allowing them to broaden their reach to many more students.

From the review above, it is clear that impediments to quality primary education are serious and widespread. Pratham’s pedagogy has proved extremely useful in addressing some core challenges, and TaRL has proved innovative, adaptable, and scalable. However, while the literature has focused on short-run effects of TaRL on learning outcomes, there are few studies that have attempted to assess whether TaRL has improved outcomes in the long-run. The question this paper
seeks to answer is whether Pratham students, now equipped with grade-level math and reading abilities, are doing better in school. Are they able to keep up with the ‘top of the class’? Or do the systemic issues in education cause students to lag behind, irrespective of whether or not they are at par with their classmates in reading and math?

**Data and Model**

For the purpose of this analysis, I will use a comparative model to test the TaRL program effectiveness over time using data from the Indian Human Development Survey (both rounds one and two). To do so, I will use data from a group districts in the Indian states of Madhya Pradesh, Maharashtra, Rajasthan, Odisha, and Andhra Pradesh. The first group (the treatment group) will be districts where TaRL has been implemented through Pratham’s Read India program, and the second group (the control group) will be districts that have not been exposed to TaRL. I will operationalize this through a dummy variable ‘TaRL’ with value 1 for TaRL-exposed districts, and 0 for non-exposure districts. I will test my hypothesis for both Math and Reading levels for 8-11-year-olds to quantify the impact of the program on learning. In addition to testing the effects of TaRL exposure on learning, I will also test for its effect on income to quantify the long-term effect of being exposed to TaRL pedagogy.
Data Sources

The data for this analysis has been gathered from The Indian Human Development Survey and Pratham data on program implementation areas. The Indian Human Development Survey,\textsuperscript{11} or IHDS, has been conducted twice; once in 2004-2005, and once in 2011-2012. Both IHDS-I and IHDS-II are nationally representative, multi-topic surveys of households, villages and urban neighborhoods across India. The data in IHDS-II are mostly re-interviews of households interviewed for IHDS-I. Both surveys cover all states and union territories of India, with the exception of the Andaman & Nicobar and the Lakshadweep islands. Two one-hour interviews in each household covered a wide-range of topics concerning health, education, employment, economic status, marriage, fertility, gender relations, etc. Children aged 8-11 completed short reading, writing, and arithmetic tests. The data are cross-sectional and consist of measurements for individual observations (persons, households, districts, states, etc.) at a given point in time.

The dependent variables in this analysis are Reading Level and Math Level (based on Pratham’s TaRL assessment tools) of students aged 8-11 years, and total household income per year. I use these as measures of learning outcomes because Pratham has used these two

\textsuperscript{11} Indian Human Development Survey, available at: \url{https://ihds.umd.edu/}
variables to assess their students in learning camps, and I also use Income as a proxy to gain insight into long-term effects.

Summary Statistics

Reading Level takes on five different values, that is, 0 - cannot read, 1 - can read letters, 2 - can read words, 3 - can read a paragraph, and 4 - can read a story. In a national sample of 12,731 students for the year 2004-2005, 1128 could not read at all, and only 4,416 eight to eleven-year-olds could read a story. Similarly, for the years 2011-2012, in a national sample of 14,702 students, only 1,281 students aged eight to eleven could not even read at all, and only 4,146 were able to read a simple story (Figure 1).

Similarly, the variable Math Level takes on four different values, that is, 0 - cannot recognize numbers, 1 - recognizes numbers, 2 - can perform subtraction operations, and 3 - can perform division operations. For the years 2004-2005, a national sample of 12,731
students showed that 2,081 students could not even recognize numbers, while 2,905 could perform division operations. Similarly, in the national sample of 14,702 students aged eight to eleven in 2011-2012, 1,821 students cannot even recognize numbers, and only 2,127 can perform division operations. (Figure 2).

![Figure 2: Number of Students at Various Math Levels (National Sample: 2004-05 & 2011-12)](image)

Of the individuals in the sample for this analysis, 10.2% of those not exposed to TaRL cannot read and 34.6% can read a story, as compared to 7.2% who cannot read and 33.5% who can read a story in the districts exposed to TaRL for both 2004-05 and 2011-12 (Table 1). Further, 19.5% in the non-exposure districts cannot recognize numbers, and 17.2% can perform division operations, while 13.4% in the exposure districts cannot recognize numbers, and 19.1% can perform division [for all years] (Table 2). When examined by year, 9.9% could not read and 33.9% could read a story in 2004-05, and 9.3% could not read and 35% could read a story in 2011-12 (Table 3). Similarly, 21.9% could not
recognize numbers, and 20.2% could perform division in 2004-05, and 14.7% could not recognize numbers and 14.9% could perform division in 2011-12 (Table 4). These figures are significant because they indicate two things about the two cohorts. First, students that have been exposed to the program have higher learning levels; and second, the cohort of 2011-12 is already better off because their learning levels are higher across all levels than the cohort in 2004-05.

**Table 1: Reading Levels by TaRL Exposure**

<table>
<thead>
<tr>
<th>Reading Level</th>
<th>TaRL Exposure</th>
<th>TaRL Exposure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td>Cannot Read</td>
<td>10.2%</td>
<td>7.2%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Letters</td>
<td>16.2%</td>
<td>13.1%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Words</td>
<td>19.3%</td>
<td>22.4%</td>
<td>19.9%</td>
</tr>
<tr>
<td>Paragraph</td>
<td>19.6%</td>
<td>23.8%</td>
<td>20.4%</td>
</tr>
<tr>
<td>Story</td>
<td>34.6%</td>
<td>33.5%</td>
<td>34.4%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Table 2: Math Levels by TaRL Exposure**

<table>
<thead>
<tr>
<th>Math Level</th>
<th>TaRL Exposure</th>
<th>TaRL Exposure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td>Cannot Recognize</td>
<td>19.5%</td>
<td>13.4%</td>
<td>18.4%</td>
</tr>
<tr>
<td>Numbers</td>
<td>36.4%</td>
<td>33.9%</td>
<td>36.0%</td>
</tr>
<tr>
<td>Subtraction</td>
<td>26.8%</td>
<td>33.6%</td>
<td>28.1%</td>
</tr>
<tr>
<td>Division</td>
<td>17.2%</td>
<td>19.1%</td>
<td>17.6%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
The average income for households in this sample is ₹75,522.28 (approx. $1,173.62), with the minimum being ₹0 and the maximum being ₹3,900,500 (approx. $60,613).

To explain variation in learning levels, I will control for various independent variables, namely, age of the students, sex of the students, total household income, number of people in the household, school type (government school or private school), and residence type (whether urban or rural).
Model

The goal of this analysis is to assess the long-term impact of TaRL programs on individuals in districts that have been exposed through such programs via Pratham. In order to do so, I am assessing the performance of two class cohorts, i.e., the cohort of 8-11-year-olds tested in 2004-05 and the cohort tested in 2011-12. I use an Ordered Probit test as follows:

\[
\text{Probability}(\text{Reading Level} = i) = \Pr \left[ K_{i-1} < (\beta_1 \text{TaRL} + \beta_2 \text{Sex} + \beta_3 \text{Income} + \beta_4 \text{NPersonsHH} + \beta_5 \text{Age} + \beta_6 \text{SchoolType} + \beta_7 \text{UrbanRural} + u) \leq K_i \right]
\]

and,

\[
\text{Probability}(\text{Math Level} = i) = \Pr \left[ K_{i-1} < (\beta_1 \text{TaRL} + \beta_2 \text{Sex} + \beta_3 \text{Income} + \beta_4 \text{NPersonsHH} + \beta_5 \text{Age} + \beta_6 \text{SchoolType} + \beta_7 \text{UrbanRural} + u) \leq K_i \right]
\]

An Ordered Probit model is used to estimate relationships between ordinal dependent variables, such as Reading Level and Math Level, and a set of independent variables. An ordinal variable is a variable that is categorical and ordered, for instance, Cannot Read, or Can Read Letters, etc. In an Ordered Probit, an underlying score is estimated as a linear function of the independent variables and a set of cut-points. The probability of observing some outcome \( i \) corresponds to the probability that the estimated linear function, plus random error, is within the range of cut-points estimated for the outcome.\(^{12}\)

\(^{12}\) STATA Base Reference Manual, Vol. 2
To assess the impact of being exposed to TaRL on income, I model a linear regression as follows:

\[ Income = \beta_1 TaRL + \beta_2 Sex + \beta_3 NP\textit{PersonsHH} + \beta_4 Age + \beta_5 \textit{SchoolType} + \beta_6 \textit{UrbanRural} + \]

For the purpose of this analysis, we are most interested in the coefficient on TaRL for all three tests.

**Results**

The results from the three tests are tabulated below and show regression coefficients, standard errors, and statistical significance. From the result below one sees that for a student residing in a district that has been exposed to TaRL, the log odds of advancing to the next reading level are 0.0125 times higher (Table 5). However, this finding is statistically insignificant. Further, the log odds of advancing to the next math level are 0.115 times higher for a student exposed to the pedagogy, and this finding is highly significant (Table 6). This positive effect of TaRL on reading and math is consistent with the literature around learning outcomes and classroom instruction. Additionally, students are more likely to advance to a higher reading and math level as they get older, as their household income increases, and if they live in an urbanized district.

Exposure to TaRL creates a `6096 (approx. $95) increase in household income as hypothesized, and this finding is significant at the
10% level (Table 7). Income also shows highly significant and positive effects as the number of people in the household increase, if the student lives in an urbanized district, and as students advance to higher levels in reading and math, as hypothesized.

The variables included in all three models were tested for autocorrelation, and results show that there is no extreme relationship for any of the independent variables.

**Table 5: The Effect of TaRL Exposure on Reading Levels via an Ordered Probit Test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>TaRL</td>
<td>0.0125</td>
<td>0.0319</td>
</tr>
<tr>
<td>Sex</td>
<td>-0.0449*</td>
<td>0.0249</td>
</tr>
<tr>
<td>Age</td>
<td>0.2348***</td>
<td>0.0116</td>
</tr>
<tr>
<td>School Type</td>
<td>0.0842***</td>
<td>0.0103</td>
</tr>
<tr>
<td>Number of Persons (HH)</td>
<td>-0.0220***</td>
<td>0.0046</td>
</tr>
<tr>
<td>Income (HH)</td>
<td>0.000117***</td>
<td>0.0000124</td>
</tr>
<tr>
<td>Urban/Rural</td>
<td>0.146***</td>
<td>0.0291</td>
</tr>
<tr>
<td>i.Year</td>
<td>-0.2125***</td>
<td>0.0292</td>
</tr>
</tbody>
</table>

*Notes: Standard errors are reported in parentheses. ***, **, * denote significance at 1%, 5% and 10% respectively.*
Table 6: *The Effect of TaRL Exposure on Math Levels via an Ordered Probit Test*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>TaRL</td>
<td>0.115***</td>
<td>(0.0317)</td>
</tr>
<tr>
<td>Sex</td>
<td>-0.0873***</td>
<td>(0.0248)</td>
</tr>
<tr>
<td>Age</td>
<td>0.2281***</td>
<td>(0.0116)</td>
</tr>
<tr>
<td>School Type</td>
<td>0.0782***</td>
<td>(0.00904)</td>
</tr>
<tr>
<td>Number of Persons (HH)</td>
<td>-0.0197***</td>
<td>(0.0046)</td>
</tr>
<tr>
<td>Income (HH)</td>
<td>0.0000935***</td>
<td>(0.0000104)</td>
</tr>
<tr>
<td>Urban/Rural</td>
<td>0.2775***</td>
<td>(0.0286)</td>
</tr>
<tr>
<td>i.Year</td>
<td>-0.15632***</td>
<td>(0.0282)</td>
</tr>
</tbody>
</table>

Notes: Standard errors are reported in parentheses. ***, **, * denote significance at 1%, 5% and 10% respectively.

Table 7: *The Effect of TaRL Exposure on Income via a Linear Regression Test*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>TaRL</td>
<td>6096.027*</td>
<td>(3705.305)</td>
</tr>
<tr>
<td>Sex</td>
<td>-7176.055*</td>
<td>(2886.336)</td>
</tr>
<tr>
<td>Age</td>
<td>-2372.437*</td>
<td>(1379.261)</td>
</tr>
<tr>
<td>School Type</td>
<td>8404.837***</td>
<td>(1379.261)</td>
</tr>
<tr>
<td>Number of Persons (HH)</td>
<td>13052.93***</td>
<td>(520.115)</td>
</tr>
<tr>
<td>Urban/Rural</td>
<td>36158.89***</td>
<td>(3318.145)</td>
</tr>
<tr>
<td>Reading Level</td>
<td>6588.535***</td>
<td>(1428.029)</td>
</tr>
<tr>
<td>Math Level</td>
<td>8434.809***</td>
<td>(1965.478)</td>
</tr>
<tr>
<td>i.Year</td>
<td>57303.32***</td>
<td>(3219.026)</td>
</tr>
</tbody>
</table>

Notes: Standard errors are reported in parentheses. ***, **, * denote significance at 1%, 5% and 10% respectively.
Issues

Some issues that I anticipate with this analysis are non-representation/misrepresentation, as well as underestimation.

Pratham and Read India operate at block level, which is lower than district level. This may cause some misrepresentation or non-representation because of the possibility that the households and individuals sampled and surveyed may not live in the Block in which the program is being implemented, but could still live in the same district.

The test for income effects in this analysis relies on household income data collected at the end of the years 2004-05 and 2011-12, and therefore does not necessarily reflect a long-term effect, rather, it reflects an average increase over two different years. Therefore, to say that the approximate ₹7000 increase in household income found is a result of long-term exposure to TaRL may be misleading. However, a positive relationship over a shorter-period may be indicative of longer-term positive trends. Further, because this analysis did not correct for difference-in-difference effects of the two years, I have not been able to mitigate the effects of extraneous factors.

Additionally, data on implementation districts have been gathered from implementation data for Pratham’s Second Chance program. This may have caused some districts to be left out of the analysis, resulting in an underestimation of the coefficients of TaRL regarding reading and math levels, as well as income.
**Case Study: Vasant and Nancy**

While the quantitative model within this paper shows a small and positive effect on learning levels, TaRL’s impact, both in the short and long term is better expressed through case studies of students who were exposed to the pedagogy. In February 2014, in a village in Uttar Pradesh, eight-year-old Vasant is unable to recognize letters. At the time, he was in the third-grade. He is visibly quiet, shy and under-confident. At the conclusion of his second ten-day learning camp that meets for only two hours a day, Vasant grabs the test sheet and quickly reads out the list of simple words in Hindi. However, he is not up to reading sentences or simple stories yet. For his third test, Vasant reads out a simple story, with a few mistakes, at the second-grade level. He is visibly louder, more confident, and quicker to read.

In September 2013, Nancy, a ten-year-old student in the fourth grade from Kamhar Katesar village in Uttar Pradesh, was enrolled in a Pratham learning camp. At baseline assessment, Nancy was barely able to read words. According to Pratham volunteers, the rest of the students in her class could barely even recognize letters. In February 2014, after two ten-day learning camps involving a variety of activities to facilitate learning, Nancy was able to successfully read a first-grade text. Three

---

13 Vasant Learns to Read, Pratham Education Foundation, available at: [https://www.youtube.com/watch?v=AJab5vl_Nw](https://www.youtube.com/watch?v=AJab5vl_Nw)
14 Nancy’s Footsteps, Pratham Education Foundation, available at: [https://www.youtube.com/watch?v=m_G7p7_eZAA4](https://www.youtube.com/watch?v=m_G7p7_eZAA4)
months later in June 2014, after her fifth ten-day learning camp, Nancy was reading at the second-grade level, albeit struggling with the Hindi word for fertilizer, ‘khaad.’ Three years later, Nancy laughs at a video of herself struggling with reading the text, amused that she could not even read the word khaad. She is now in the seventh grade and is able to successfully read at her grade level. According to Nancy’s mother, before joining the program, Nancy had low self-esteem and did not talk much. She also struggled with school and did not score well in tests. However, three years down the line, Nancy’s mother goes as far as to call Nancy ‘chatty,’ and says that not only does she talk more confidently now, she also does well in school. Nancy is advanced enough to also participate in a community-based digital learning program. Every evening, Nancy and a group of friends watch instructional videos together on a tablet provided by Pratham. According to her mother, Nancy used to play and ‘wander’ a lot, but now she spends her time keeping up with classes and learning with her friends.

From Nancy’s story above, it is clear that gaining those foundational competencies is extremely important in keeping up with one’s class and cohort. From Vasant's story, one sees that TaRL is largely successful in doing so very effectively, and in a very short period of time. This is consistent with the literature presented above. Once students are given the opportunity to learn, whether through the presence of teachers who are equipped with better teaching
methodologies or engaging curricula in the form of activities, students are better equipped to grasp key concepts. Over time, students like Nancy are benefitted by being at-par with their classmates because they are better equipped to take advantage of the opportunities and resources, such as tablets, available to them and those around them.

**Conclusion**

This paper reports a significant and positive relationship between exposure to pedagogies, such as TaRL, and learning outcomes. For both reading and math, students are more likely to advance to the next higher learning level if they are exposed to the program, than if they are not. Specifically, they are 0.0125 and 0.115 times more likely to do so for reading and math respectively. Additionally, exposure to TaRL programs has shown an increase in income by approximately ₹7000 or $95.

While the numbers above do not necessarily reflect a truly ‘long-term effect’ due to the limitations of data availability and district vs. block analysis, future studies could potentially focus their efforts on collecting data on individual outcomes through administration of ‘tracking’ surveys every year in order to capture individual-level effects of the pedagogy. This would allow the surveyor to follow income and health trends, and also capture learning progress as students advance.
from one grade-level to the next. This will allow for a more accurate long-term picture of the impact of TaRL.

Nevertheless, positive findings of this nature hold an important implication for policy around primary education. If pedagogies such as TaRL create significant impacts on learning levels, parents and students are potentially more likely to enroll and attend programs and classes that implement these specific teaching methods. Given the potential increase in demand for such programs, governments, local governing bodies, and school authorities could potentially be open to introducing more such programs into mainstream schools. Studies highlighted above have already shown the potential scalability of remedial programs using TaRL so as to use them in a government school classroom, and the positive impact established in this paper only reaffirms these findings.

On a broader scale, a review of the literature has shown various positive externalities of a quality education and of higher learning outcomes. If one has received a quality education, they are more likely to be healthy, to be employed, to earn more, and to generate long-term intergenerational benefits. However, quality of education and a lack of skills remains a pervasive issue for India. There remains a huge risk that, despite schooling, another generation of Indian students will enter the workforce and adult life with grossly inadequate skills (Mukerji (2013)). Muralidharan (2013) has discussed a popular refrain among
employers in India that the majority of college graduates are not ‘employable’ due to the lack of skills commensurate with their paper qualifications. If the quality of their education hampers the ability of an individual to build a career and earn an income, then addressing these issues of quality must be a top priority for policymakers. That is, it is urgent to address the quality of primary education, not just through monetary inputs via buildings and infrastructure, or via raising enrollment; rather, it is important to focus policy efforts in the direction of learning outcomes. Currently, the Indian Ministry of Human Resource Development is working to draft a ‘New Education Policy,’ which aims to revamp the current education scenario in India to make it more ‘learner-centric,’ rather than ‘teacher-centric.’\textsuperscript{15} However, no date has been specified with respect to its release nor to its implementation, and it remains to be seen whether real changes in quality will manifest. In the meantime, pedagogies like TaRL are useful in that they are able to address at least basic reading and math skills, albeit at the most basic level. Once students grasp basic competencies in reading and math, they will be more likely to proceed at-par with their peers.

Hence, as this paper has attempted to show, a policy focus on quality education, pedagogical innovation, and learning outcomes is

desirable. A more detailed analysis of the enabling conditions is recommended for further research.
Appendix: Pratham Assessment Tools

For Reading:

**Story**

A big tree stood in a garden. It was alone and lonely. One day a bird came and sat on it. The bird held a seed in its beak. It dropped the seed near the tree. A small plant grew there. Soon there was another tree. The big tree was happy.

**Paragraph**

Rani likes her school. Her class is in a big room. Rani has a bag and a book. She also has a pen.

**Letters**

e  d  w  s  c  g  h  z  i  q

**Words**

hand  star  bus  cat  book  day  few  old  sing  bold

**Source:** ASER Center, Pratham Education Foundation, available at: [http://www.asercentre.org/p/141.html](http://www.asercentre.org/p/141.html)
For Math:

<table>
<thead>
<tr>
<th>Number recognition 1 &amp; 9</th>
<th>Number recognition 10 &amp; 99</th>
<th>Subtraction</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51</td>
<td>46</td>
<td>7 \underline{879} (</td>
</tr>
<tr>
<td>4</td>
<td>83</td>
<td>-29</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>37</td>
<td>47</td>
<td>6 \underline{824} (</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td>-28</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>92</td>
<td>8 \underline{985} (</td>
</tr>
<tr>
<td>9</td>
<td>26</td>
<td>-76</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>91</td>
<td>52</td>
<td>4 \underline{517} (</td>
</tr>
<tr>
<td>5</td>
<td>43</td>
<td>-14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>66</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** ASER Center, Pratham Education Foundation, available at: [http://www.asercentre.org/p/141.html](http://www.asercentre.org/p/141.html)
Bibliography


