

## On Recognizing Skill Formation as a More Effective Development Strategy

Atonu Rabbani<sup>1</sup>

Associate Professor, Department of Economics, University of Dhaka

Date: March 19, 2016

### 1 Introduction

I will use the word “skills” throughout this paper in a more general sense and not limited to the more common meaning of vocational or professional training. Skill formation, as it is more commonly used in the labor economics or human capital literature, is probably the most important factor for an individual or a nation to maintain high level of income, ensure general well-being and attain a capability allowing the citizens to reach their potentials. Human capital or skill formation can also have positive externality both across individuals (often inter-generationally) and across nations.<sup>2</sup> Skill formation starts at a very early stage of a person’s life and the agency of such investment relies on the parents or the guardians. Hence, there is also missing market implications where parents can make the decision to invest that may be sub-optimal from the child’s point of view (possibly because of liquidity constraint or opportunity cost of child’s time in the labor market). Moreover, lack of access to education can lead to more societal inequality, contributing further to the deterioration of subjective well-being and political culture. Hence, investing in skill formation and human capital is generally considered necessary for individual well-being and both national and global economic growth and development.

The global development agenda is moving from *Millennium Development Goals* to adopting a more ambitious set of *Global Goals*. So it is an appropriate time to carry out some stock taking of the education interventions that can prepare the population especially from a low and lower-middle income country like Bangladesh for the labor market challenges for the coming years. This is especially true in a more globalized economy with interconnected societies and nation states where education can play even more effective roles for further labor market assimilations (through migration and possibly ever increasing refugee incidents). The needs for general human capital accumulation have not been more important in the recent time. This is further complicated by emergence of global supply chain ecosystem and automation where it is possible that individual competitiveness will greatly depend on the types and extent of accumulated skills.

Bangladesh has otherwise a commendable record when it comes to education attainment and success over the MDG era. According to the official statistics, the net en-

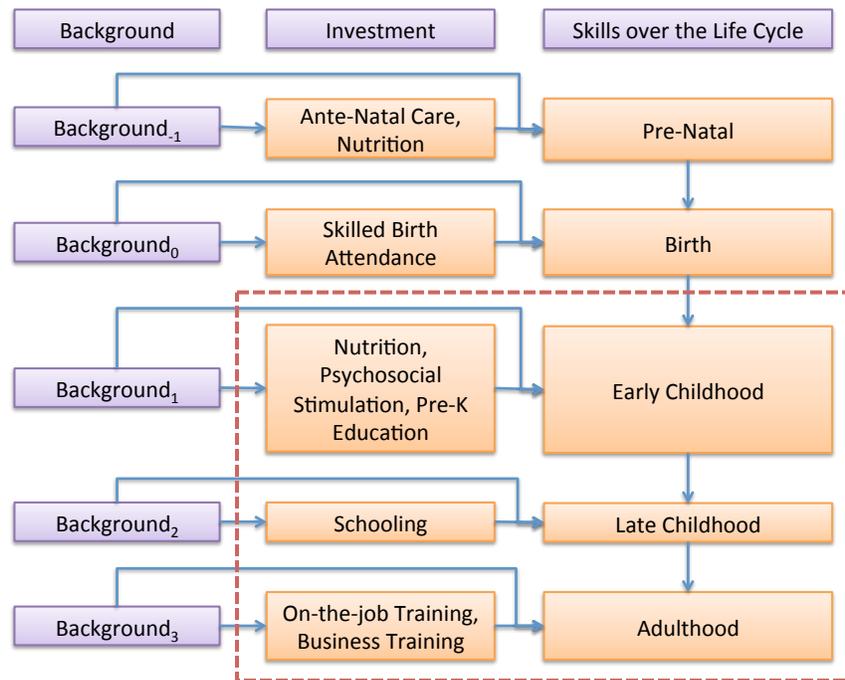
---

<sup>1</sup> The author can be reached at [atonu.rabbani@gmail.com](mailto:atonu.rabbani@gmail.com). This paper was conceived as a background paper for Copenhagen Consensus as part of its *Bangladesh Priorities* project. The views expressed here are author’s own.

<sup>2</sup> Cross country learning has a rich tradition that pre-dates nation state formation. Michel (2007) accounts the cultural exchange that aided the knowledge transfer from Europe to Japan during the 17<sup>th</sup> century. Another important and relevant example is management training that took place in the ready made garment sector when a local garment business Bangladesh sent and trained their employees in a Korean factory (Daewoo) in the 1980s. These workers pioneered the emergence of the largest manufacturing industry in Bangladesh over the past four decades (Mostafa and Klepper 2010).

rolment rate for the primary level of education is about 98.8 percent for the girls and about 96.6 percent for the boys. This is certainly impressive all the more because of the achievement in gender parity in primary level enrolments. Bangladesh has achieved this within a fairly short period of time and has performed at par or better than some of her more affluent neighbors.

While this is impressive, there are a couple of issues remaining on the table that policy makers and education experts of the country need to address over the coming years, regardless how they are treated in the era of Global Goals (or Sustainable Development Goals). The net enrollment rates beyond primary level still remains low suggesting a high drop out rates beyond the fifth grade. Moreover, we do not have a systemic understand of the quality of the education and how they contribute to later life achievements. Given that manufacturing process is expected to become more automatic and IT based with lean management techniques, it is possible that the skill mix needed to effectively contribute to producing value in a more interconnected world will be different. Whether Bangladesh, like many other low and/or lower middle income countries, is equipped to provide the students with such training remains to be seen.



**Figure 1: A Stylized Scheme for Skill Formation over Life Cycle**

Note: Adopted from Elango, et al. (2016). The present study primarily focuses on the skill formation as suggested by the dotted box within the overall skill formation.

In this context, my approach in the paper will be to bring together certain important aspects of skill formation and human capital investment with the current organization and institutional set up as given. Firstly, it is important to recognize that skill formation is a dynamic process over a long period of time for a person’s life, starting possibly even before birth. This is the central argument that Heckman has made in a series of papers with his coauthors (see Figure 1). Such a model of skill formation suggests three

important aspects of education, learning and human capital acquisition. First, it is important to recognize the skills that allow a person to a fuller life are multiple in natures. Typically the education system focuses disproportionately on IQ-type capacities of an individual and achievement tests. A growing literature addresses the importance of non-cognitive, social and psychosocial skills. Many of these skills are developed before formal schooling within diverse environments such as home, day-care and also pre-school (which can well be formal in nature). Second, skills can be self-producing and complementary. In other words, the returns to later life education, market or non-market, can have higher returns if parents decide to invest more in the earlier periods of lives. Third, skills at certain period can facilitate the investment in other periods and existing literature suggests that the process is more sequential in nature. Hence, the early life investment in human capital acquisition can provide the foundation upon which later life investments are made.

This model then certainly suggests returns to education with a negative gradient for the same amount of investment over how late such investment is made (see Figure 2). It will be wrong to interpret this chart as suggesting that we should focus solely on the early childhood education. As a matter of fact, the potential returns from any period will only be realized if there is a continual investment in skill formation and high quality learning experiences. As a matter of fact, in the context, I will argue professional and business training to workers, managers and entrepreneurs can have important implications for economic growth and sustainable development.

Second broad principle for designing an effective education policy should be the recognition of autonomy in decision making and entailing equilibrium outcome that may be self-enforcing. The implication of which is that a program or intervention will only be successful if it addresses the existing situation that may be optimal (in the strict economic sense of the term) from the point of view of the households. This can have a number of implications for designing the programs in the post-MDG era. First, it is important to understand the nature of skills that may be more useful in the labor market, given education is a very long-term investment (usual schooling requires a person to study for about fourteen to sixteen years). Second, it may be very important to pay attention to the non-market returns of education. For example, even after strong female labor force participation through RMG sector and proliferation of microfinance market over last thirty years or so in Bangladesh, the median age of first marriage for women remains one of the lowest in the world.<sup>3</sup> With considerable premium in the marriage market for the younger bride and relatively low returns to education in the low-skilled RMG jobs, the households or the parents may certainly find it more lucrative to marry off the young daughters. Hence, it is possible that simple supply side solution may fail to reap the best benefit from targeted resource allocation for education, a point rarely pondered in the education policy literature.

Given that this paper is ambitious in the sense that rather than focusing on any specific interventions, it will review the existing literature to gather understanding on how different types of interventions are designed to contribute to the different aspects of skill formation as suggested by Figure 1. Hence, we will focus on different interventions

---

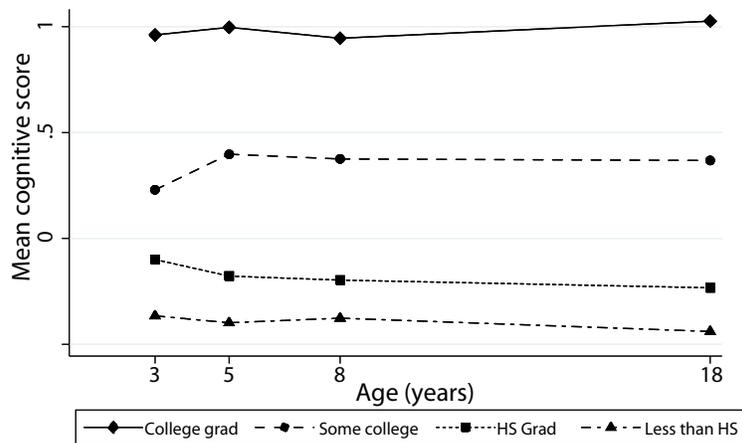
<sup>3</sup> According to a report by Plan Bangladesh, 64 percent of the women between 20 and 24 years of age were married before 18 years of age, the legal age of marriage in Bangladesh. See Plan Bangladesh (2013).

that aim to increase participation and human capital investment at different stages of skill formation over the life cycle. We will first focus on existing evidence on early childhood education interventions. We will then discuss interventions that aim to increase school attendance and lower drop out rates. Since attendance may not be enough to increase students' test performance and learning, we will discuss some of the recent interventions that aim to increase test scores. Lastly, we will discuss professional and business training. Such trainings can both allow individuals to set up and grow small businesses because of the informal nature of the labor market in the developing countries. However, we will also draw upon the recent works on management practices that can train low-skilled workers to get promoted as managers allowing them to contribute more to the firm level productivity.

## 2 Early Childhood Education

### 2.1 Roles of ECE in Skill Development

Plato was one of the earliest figures on records emphasized the roles of early childhood interventions. As a matter of fact he held a firm belief that education started even before birth from the conception of a human life. This particular view can still resonate among most education experts and policy makers, though exact roles of different factors may hold less of a consensus.<sup>4</sup> The literature has moved beyond the simple nature versus nature debate and the development is considered a complex interplay among hereditary traits, how those traits are expressed into specific phenotypes and environmental inputs that children can start receiving even before birth and throughout their lives.



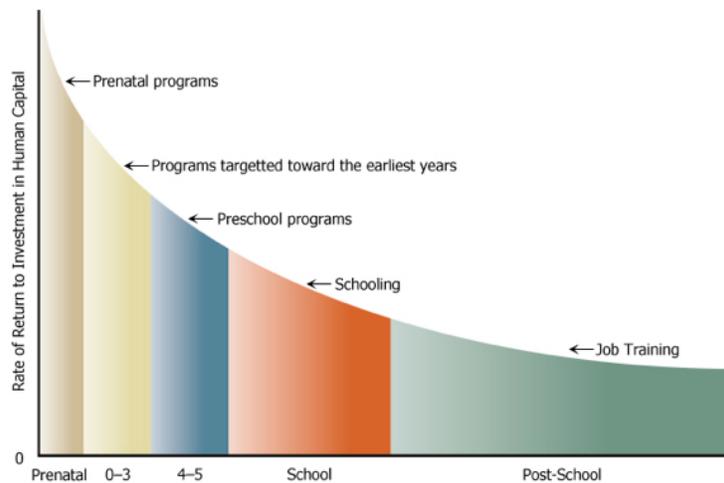
**Figure 2: Trend in Mean Cognitive Score by Maternal Education**

Note: The figure is taken from (Heckman 2008). Missing observations were assumed to be random.

<sup>4</sup> One can find repeated references to education, its roles in society and state's roles in education throughout many of Plato's writings especially in *Republic* and *Laws*. He further recognized that caring for both the soul and the body of an individual may well start before birth and development of a person is much higher during the first five years compared to the following twenty years.

The importance of early childhood interventions can be inferred from Figure 2. The figure shows the mean cognitive scores stratified by the education level of the mother of the respondents. We find that at age 18 there is a considerable variation in mean cognitive scores. However, that variation has a much earlier root and the age 18 outcomes persist from an early age of three. This shows ability can have intergenerational implications and so can associated labor market outcomes. Given the complexity in the interplays among different factors that result in the early life distribution in the cognitive scores it is important to focus disproportionately more during the formative period of a person's life.

The other important aspect of ECE is that it should not be solely focused on the cognitive ability of a person. Cognitive abilities are generally measured through IQ that has been proved to be malleable and right motivations can effectively close the gap between the low achievers in IQ test and their higher achieving counterparts when rewards are distributed based on the right answers.<sup>5</sup> As a result of the accumulation of similar evidence, researchers in the field of human capital accumulation and skill formation are increasingly emphasize on the psycho-social skills and non-cognitive ability of individuals. Unfortunately, the current education efforts also focus primarily on the test scores that typically measure the cognitive abilities of a person suggesting education interventions can under-realize the potentials of a person (Heckman 2008).



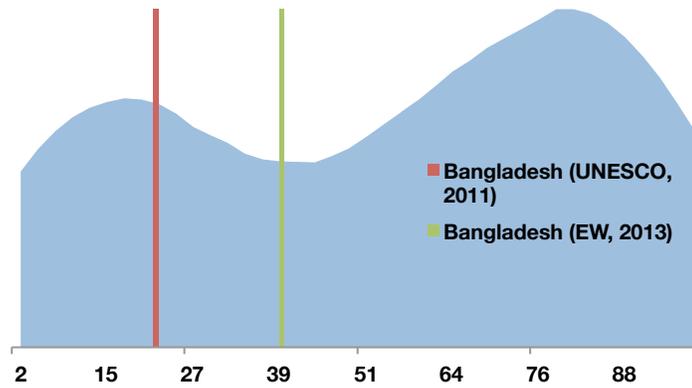
**Figure 3: Returns to Unit Dollar Invested during Different Phases of Life**

Source: Heckman (2000).

In Bangladesh, the over all net enrolment at the pre-primary level of education is about 22.8 percent as of 2011 according to UNESCO's education data set and about 40.4 percent according the Education Watch, 2013 (see Education Watch 2013 [2014]). The discrepancy between the two sources is not easy to reconcile because of the methodology and definitions. In any case, it suggests that Bangladesh is still lagging behind the world average of about 54 percent (or a median of about 59 percent).

<sup>5</sup> Edlund (1972) carried out the classic test in the late 1960s which has later been replicated in other areas. The motivation treatment can effectively increase the IQ score by about one SD for the children who otherwise exhibits a low mean score in the pre-intervention IQ tests with no impact for the groups that scored higher in the same test.

However, between 1998 and 2013 the enrolment at the pre-primary level has grown more than four fold from 9.3 percent to 40.4 percent. The net enrolment is slightly higher among girls and considerably higher in the urban areas.



**Figure 4: Distribution of Net Enrolments at the Pre-Primary Level across Different Countries**

Source: UNESCO education dataset. The green vertical line shows the net enrolment rate for 4-5 years old, which is taken from Education Watch Report (2013).

While pre-primary education certainly not a new phenomenon in Bangladesh, very recently in 2014 the government of Bangladesh has taken the decision to establish pre-primary education through the government and non-governmental primary schools. Currently, the policy mainly focuses to add one more year before students start the first grade at age six. However, many schools and parents arrange children to attend schools even earlier. This may allow the children to have a head start, however, this may also contribute to the intergenerational income inequality. We also have very limited understanding on both short term and long term impacts of early childhood interventions and factors that may lead to better cognitive outcomes and psychosocial performances in the context of developing countries, which certainly require more research and knowledge generation.<sup>6</sup>

## 2.2 Main Components

Early childhood interventions can vary significantly across different programs, targeting and coverage. ECE aims to intervene children before they enter “normal” school, which usually takes place at the age of five or six. Some programs include kids right after they are born, while other includes children at a much later age like three or four. The programs that include young children usually include health interventions in addition to cognitive stimulation. The health interventions can cover health information, physical inputs (such as diapers), nutritional supplements and instruction to parents. The education components typically include play-based learning, language development, psychosocial stimulants and simple problem solving. Furthermore, ECE also in-

<sup>6</sup> There are considerable evidence on nutrition and other biological exposure (such arsenic contamination) on cognitive outcome and even test scores. See Hamadani, et al. (2014).

cudes home visits, both during weekends and weekdays by trained teachers and also center-based classroom sessions. The variation in programs can also contribute to the cost per beneficiaries and types of outcomes that researchers have measured, making it very challenging to compare impact evaluations comparable across different programs.

There are biological reasons why early childhood education interventions are particularly effective. During the first five years (if we ignore the *in utero* development of the fetus), brain plasticity and neurogenesis are high and children are particularly susceptible to effective learning that can contribute towards later life learning, skill formation, human capital investment, earning and income potential and even positive health outcomes. It is estimated that about over 200 million children under-five are not reaching their development potentials (Grantham-McGregor, et al. 2007). Ante natal care, skilled birth attendance and delivery at well-equipped facilities, and nutritional support are associated with better child development. However, recent studies also find that psychosocial stimulants can raise cognitive outcomes at a very early age (Attanasio, et al. 2014). Hence, comprehensive education interventions at an early stage can potentially compensate for lacking in other dimensions.

### **2.3 Modalities**

There are possibly three different modalities that policy makers can potentially adopt when it comes to delivering early childhood to potential beneficiaries and many times there are also not mutually exclusive. Many programs such as Perry Preschool Project (PPP) and the program in Jamaica targeting stunted children had home visits and supervised stimulation protocol (Elango, et al. 2016, Gertler, et al. 2014). In the Jamaican study, the children in the treatment group received one-hour weekly play sessions over a period of two years and community health aides delivered this (Gertler, et al. 2014). There are parent-centric interventions that can improve the cognitive outcomes among small children and at the same time such parents also reap the benefits by exhibiting lower stress, especially if the children has special needs because of autism or language challenges (Estes, et al. 2014).

Additionally there may be facility-based interventions where children may spend a time of the day or week to receive special attention and a learning environment. With rapid urbanization and increasing female labor force participation day care centers can increasingly play a cost-effective and possibly privately funded role, either fully or partially, as a mean for early childhood intervention. Moreover, women are also primarily responsible for the household chores. Hence, formal well-equipped facilities providing child care services to the mothers, working either outside home or domestically, can be very effective conduits for delivering learning services to the pre-school aged children in the developing countries that are quickly modernizing.

Lastly, there can be more formal pre-school intervention based at regular schools. This can start as early as from the three years of age while it can start with a year worth of pre-schooling. The regular schools manage the delivery of the early years of schooling possibly under the guidance of the central education authority (for the government schools in Bangladesh, for example, see Education Watch, 2014). However, there are considerable heterogeneity in how schools engage in delivery of early childhood education in terms of duration that can vary from one to four years, subjects, class size, curriculum and medium of instructions (because of the supposed premia that labor market allows on English language skills).

## **2.4 Evaluations of ECE Interventions**

We will summarize the estimated impacts of the ECE programs by evaluations that looked primarily at the US programs and then follow up with evaluations that were carried out outside the US. We are seriously restricted by rigorous evaluations of ECE programs. There are also very few programs that have addressed evaluation of programs at a much longer period that allows one to evaluate the ECE interventions that allow to understand the impacts on labor market outcomes and other aspects of life such as crime and marriage market outcomes (evaluation of Perry Preschool Program and Jamaican Program are two notable exceptions (Elango, et al. 2016, Gertler, et al. 2014).

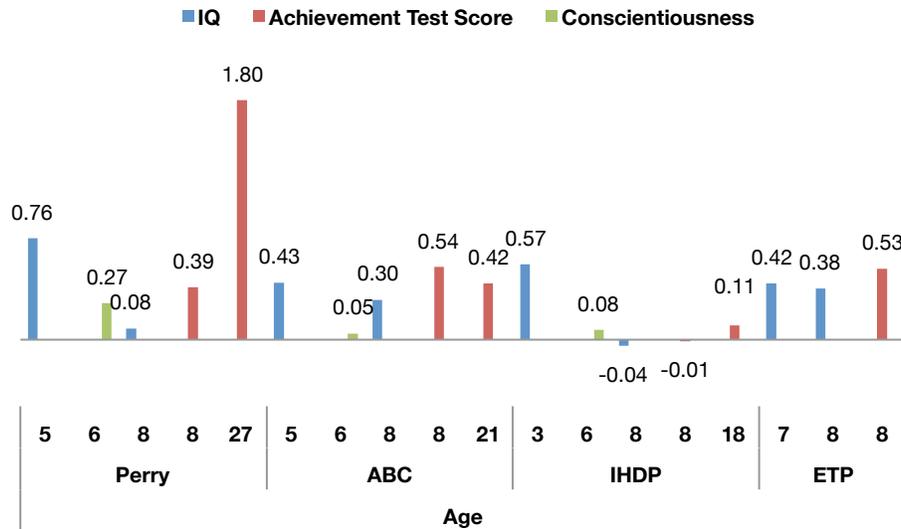
The ECE interventions generally have positive impacts on early life outcomes such as cognitive outcomes and achievement tests (see Figure 5, also Elango, et al. 2016, Zoritch, Roberts and Oakley 2000). Perry Preschool Project (PPP) exhibits a reported impact of about 0.76 SD at age 5 IQ test, while it falls to about 0.08 SD at age 8 IQ test. For Carolina Abecedarian Project (ABC) program, the impacts on IQ are more persistent (0.43 SD and 0.30 SD respectively at ages 5 and 8). This is also similar to Early Training Project (ETP) program with impacts of about 0.42 and 0.38 SDs at ages 7 and 8 respectively. Meta analyses that measure the weighted average of various studies by pooling results from different sources suggest further impacts at even an earlier age. For example, at three year, participating children can exhibit impacts of about 14.37 IQ points and 8.02 IQ points at age five (see Zoritch, Roberts and Oakley 2000).

We can further look at outcomes for achievement tests and school performances. Figure 5 suggests PPP had an impact of about 0.39 SD on age 8 achievement tests while ABC has an impact of about 0.54 SD and ETP shows an impact of 0.53 SD. Of all such programs, Infant Health and Development Program (IHDP) shows the most muted impacts. However, if we pool all these results together we can infer that early life interventions can have significant impacts on test scores and achievements at later stage of education as suggested by the dynamic nature of skill formation suggested in Figure 1. We can further look at effects on grade retention, which is considerably lower among the children who have received preschool interventions (a pooled average odds ratio of about 0.47) and also less likely to need supplementary special education (a pooled average odds ratio of about 0.29). This suggests that ECE can actually free up resources that one may need at later stage of life.

We can further look into longer term impacts of ECE that shows that achievement test results are better for children receiving preschool interventions as late as at age 21 (about 0.42 SD for ABC) and 27 (about 1.8 SD for PPP, see Figure 5). The children receiving ECE under PPP are also more likely to hold a job at age 19 and fewer are on welfare assistance (Zoritch, Roberts and Oakley 2000). One also finds that delinquent and unlawful behaviors at the latter stages are also less for the children who receive ECE (Schweinhart 1993, Zoritch, Roberts and Oakley 2000).

We turn our attention to evaluations of non-US ECE programs and if we consider reviews or meta-analysis that allows a reasonable threshold for the quality of methods to understand the impact of the program using a properly constructed counterfactuals we get only six studies (see Leroy, Gadsden and Guijarro 2011). This excludes the Jamaican study that we will discuss separately because it is the only one that allows evaluations of long-term impacts of early childhood interventions (see Gertler, et al. 2014). Furthermore if we focus more on the child development outcomes then we need to restrict our attentions to only four studies (Behrman, Cheng and Todd, 2004; Berlinski,

Galiani and Gertler, 2008; Berlinski, Galiani and Manacorda, 2009; Bernal and Fernández, 2013). Additionally we also include information from (Attanasio, et al. 2014) which is not part of the original review paper (Leroy, Gadsden and Guijarro 2011).



**Figure 5: Impacts on IQ, Conscientiousness and Achievement Score for Different ECE Interventions**

Note: The coefficients for different interventions and outcomes are taken from Elango, et al. (2016).

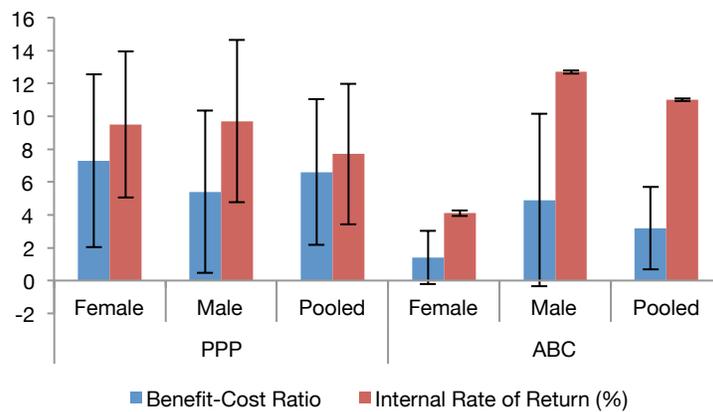
A general observation from all these studies is it requires a minimum length of intervention to have a positive impact on developmental outcomes for the participating children. For example, for the children who received the intervention for 15+ months, the social isolation is lower and children are more interactive as a result of the EC program (Bernal and Fernández 2013). Cognitive outcomes are also higher if the ECE interventions are more than fifteen months with positive impact on mathematical reasoning, verbal ability, general knowledge and higher test scores in the fifth grade. Other programs required an even longer intervention to identify a statistically significant impact on language, auditory and psychosocial skills, among others (Behrman, Cheng and Todd 2004). Other studies also showed similar impacts for mathematics, language (Spanish) and behavioral outcomes (Berlinski, Galiani and Manacorda, 2009) Furthermore, preschool intervention can also lead to higher attendance and schooling at later age (Berlinski, Galiani and Gertler, 2008). Moreover, a recent paper by (Attanasio, et al. 2014) shows that cognitive stimulants for preschool aged children can be sufficient to increase cognitive scores and receptive language.

None of these results show long term outcomes. However, there is one study from Jamaica that look at long term impacts of a early childhood intervention over a period of 20 years. The initial intervention involves psychsocial stimulants to growth stunted toddlers in Kingston, Jamaica. A follow up after 20 years finds that the intervention increases earnings by 25% and this is enough to close the gap between non-stunted counterparts (Gertler, et al. 2014). Hence, this allows evidence that initial gap can indeed be narrowed with a carefully design intervention at an early age.

We can infer from about a dozen studies that are primarily concentrated in the US and Latin America that ECE interventions can have positive impacts on cognitive skills and test outcomes during the later stages of schooling and can also have longer term impacts (as evident from evaluations of PPP and Jamaican interventions). Unfortunately, rigorous evaluations of ECE are hard to come by for other regions, a research gap that should be addressed in the coming years, perhaps during the time when so-called Global Goals are implemented.

### 2.5 Cost-Benefit Analyses of ECE

It should be noted that ECE interventions can have multidimensional impacts by increasing cognitive abilities, social inclusion, reducing delinquent behaviors and criminal activities and earnings in the long run. Hence, it is very difficult to find the right cost-benefit analysis and it may be even presumptuous to extrapolate the benefit-cost ratios from a different country to draw policy conclusion for a country that is at a very different level of socioeconomic development. However, experts and researchers make strong case for pay special attention to early childhood interventions. While there are strong theoretical justifications to invest in such interventions, it is important to understand the returns to investment specially because resources are more scarce in the developing countries with low income and limited resource mobilization capacities because of low tax coverage.



**Figure 6: Benefit-Cost Ratios and Internal Rate of Returns for Two Early Childhood Education Interventions**

Note: The results are from Elango, et al. (2016). PPP results use a discount rate of 3 percent and ABC results use a discount rate of 4 percent.

Here we present the most comprehensive and credible benefit-cost analysis along with internal rates of returns of the two US based preschool interventions namely PPP and ABC. The results are presented in Figure 6. In general, there are claims that the benefit cost ratios for early childhood intervention can range from 4:1 to 7:1 (see Duncan, Ludwig and Magnuson 2007). These values are somewhat supported by more careful measures of benefit cost ratios incorporating more comprehensive social benefits that can accrue from ECE. For example, evaluation of PPP suggests a benefit cost ratio of 6.6 for both sexes with women accruing a little higher compared to men (see Figure 6, also Elango, et al. 2016). The internal rate of returns can potentially amount to

about 7.7 percent with a little higher individual for either sex. ABC shows a little higher return of about 11 percent. The returns for men are much higher because of the larger impacts on crime reduction. ABC suggests a benefit cost ratio of 3.2 because of larger cost to the society.

## 2.6 Benefit-Cost Analyses for ECE in Bangladesh: An Exercise

As the review suggests there are only limited evidence on long-term impacts of early childhood education interventions. We specifically use the insights from the Jamaican study to understand the impacts of ECE interventions on long-term labor market outcomes. As Gertler, et al. (2014) shows, very early childhood interventions can increase workers' earnings by about 30 percent, generally closing the gap between the children who might have fallen behind because of other adverse events such as nutritional deficiency. A similar study by Hamadani, et al. (2014) also suggests that short-term gaps in cognitive outcomes can also be explained largely by children's exposure to home stimulations.

**Table 1: Benefit Cost Ratios for ECE Interventions**

		Deadweight Loss (as % of unit cost)					
		0%	10%	20%	30%	40%	50%
Discount Rates	3%	27.9	25.4	23.3	21.5	19.9	18.6
	5%	18.2	16.6	15.2	14.0	13.0	12.1
	7%	12.8	11.6	10.7	9.8	9.1	8.5
	9%	9.6	8.7	8.0	7.4	6.9	6.4
	10%	9.0	8.1	7.5	6.9	6.4	6.0
	11%	7.7	7.0	6.4	5.9	5.5	5.1
	13%	6.5	5.9	5.4	5.0	4.7	4.4
	15%	5.9	5.3	4.9	4.5	4.2	3.9

Notes: Author's calculations.

I assume a program that exposes 4 and 5 year-old children to a two-year center-based ECE programs. The program is designed to deliver ECE to 40 students in two shifts by two trained attendants with a helper. I have made some assumptions regarding how much such a center may require in terms of rent and the set up costs. I estimate that it may require about BDT 12,450 per student each year. According to the latest labor force survey (published in 2013), the average monthly income in Bangladesh is about BDT 13,305 (in 2016 prices). So if we extrapolate the Gertler, et al. (2014)'s estimate from the Jamaica study we get an annualized increase of about BDT 47,897. We further assume that the individual enters the labor market at the age 19 and stay active until 50 and my benefit cost ratios are based on these assumptions. The results are shown in Table 1.

I have estimated the benefit cost ratios for a wide range of discount rates ranging from 3 to 15 percent. I have also assumed deadweight losses that may be associated with transferring resources through possible public channels. The estimates show that the benefit cost ratios (BCRs) can be as high as 28 for no deadweight loss and a low discount rate of 3 percent. A more reasonable real social discount rate (reflecting the cost of capital locally) of 9 percent and 30 percent of deadweight loss we get a benefit ratio of about 7.4. These are certainly high numbers and can be comparable to, if not

higher than, large infrastructural projects (such as Padma multipurpose bridge, see Raihan and Khondker, 2010). BCRs for this hypothetical scheme are also comparable to the BCR estimates for the ECE programs carried out in the US (see Figure 6). The scheme also suggests an internal rate of return of about 19 percent, which is much higher than the US ECE programs because of the lower upfront cost.

### **3 School-based Interventions to Enhance Learning**

#### **3.1 Overview of Education Interventions**

For an individual the main formal schooling takes place over a period of about twelve years in more formal establishments. It is possible to divide the schooling into two parts: primary schooling comprising grades one through five and the secondary schooling that adds another seven years of schooling. Both MDGs and the Global Goals or SDGs will continue to focus on the primary schooling. However, it is natural to assume the governments, policymakers and experts will emphasize on the total twelve years of schooling partly because of changing nature of the labor market and skill demand that may go through a radical changes in the coming years (Frey and Osborne 2013).

In this section, we will provide an overview of different education interventions that aim to increase school attendance, lower grade retention as well as drop out and improve test scores (i.e. address education quality). However, in line with the second principle, the households will find it beneficial to send their children school only if the perceived benefit of sending children to school outweighs the cost. For many households the decision is infra-marginal in the sense government policies or interventions will not change their equilibrium decision to send and keep their children at school.<sup>7</sup> As a simple corollary, this is also true for the households that decide not to send their children to school. In part this may be because of the quality of the schools that they have access to. So many of the school based interventions target the supply side actors such as teachers and school management to explicitly create a demand for education services that the households may find useful. Moreover, often school-based interventions can successfully increase attendance and continuation of students without any positive impacts on test scores or achievements.

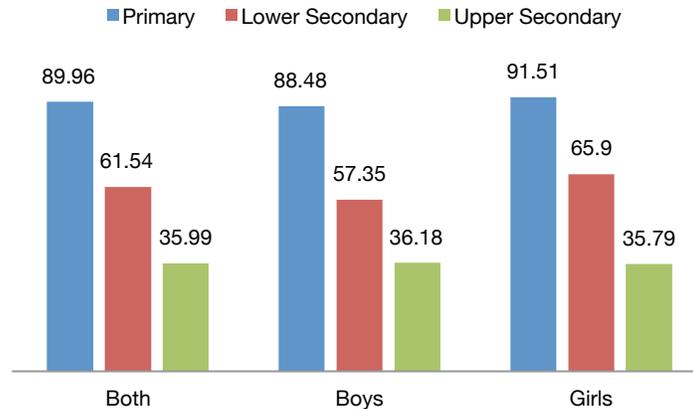
Many of the programs directly target reducing cost of school participation so that households find it profitable to send their children in the new regime (Petrosino, et al. 2012). Such interventions include conditional cash or food transfer, extending the school choices by providing vouchers, school fee reduction or providing completely free school (sometimes directed to girls), scholarships and fellowships. At the same time interventions also target educational practices and mode of deliveries. Building schools and improving infrastructures are also important interventions that have been put to evaluations. Apart from education interventions it has also been found that health and nutrition interventions can also have significant and cost effective impacts on school attendance. Deworming is a good example of this (Glewwe and Miguel, 2008).

---

<sup>7</sup> For the purpose of this paper, I am ruling out home schooling partly because we do not have any data for that for the developing countries. Also, it is possible that it is not very relevant for Bangladesh as much as it is in some of the developed countries.

### 3.2 Effects on Enrolments, Attendance and Other Quantitative Aspects

The economics of education intervention literature can be divided into two broad two types of outcomes. In this section we will primarily look at the quantity aspects of education outcomes, which are basically bringing and keeping children in schools - delivering education at the extensive margin. This is reasonable because many school age children stay out of school or they drop out soon. We can see this in Figure 7. While the primary enrolment rates are high at almost 90 percent for both boys and girls, these rates dissipate fairly quickly during the post-primary levels.



**Figure 7: Net Enrolment Rate for Bangladesh at Different Levels of Schooling**

Note: The data for primary level is for 2010. The data for lower and upper secondary levels are for 2013. These are the latest years for which net enrolment rates are available from UNESCO education dataset.

If we restrict ourselves to the studies covered by (Petrosino, et al. 2012), we find that on average education interventions allow a positive impact on enrolment with an average treatment effect is about 0.18 SD (as estimated by Cohen's d statistics). While there is a wide variability in the estimates, the results overwhelmingly suggest that as long as the interventions are well designed, based on the careful evaluations, we can infer that targeted interventions can have positive impacts at the extensive margin. We can look at other similar outcomes such as attendance and dropout rates. The former exhibits an average treatment effect of 0.15 SD based on 33 studies and the latter exhibits an average treatment effect of 0.05 SD based on 18 studies. Conditional on attending school, based on 15 studies, we find an average treatment effect of about 0.13 SD. However, the length of follow up varies considerably across studies.

We can further stratify the impacts on school enrolment and attendance by types of interventions. The existing result suggests health interventions and providing access through building school infrastructures have the biggest impacts on enrolment and attendance outcomes. Educational practices and information campaign infrastructures usually are not very effective in increasing access to education. As noted before, health interventions such as deworming can have surprisingly large and effective impacts on school enrolment and cost effective analysis reveals that such interventions can also be cheapest as well (see Dhaliwal, et al. 2012). Demand side interventions that provide

conditional cash or food transfer or direct subsidy can also have significant impacts on school attendance.

To summarize, the interventions that aim to increase school enrolment, attendance and reduce drop outs and grade retention, can largely be effective. We have limited understanding how much these interventions can be useful in maintaining the quality side of education. We will next turn our attention to reviews and interventions that focus primarily on achievement outcomes such as test scores based on studies that pass a minimum threshold for the study quality. We will do it in two steps. We will first focus on studies that include both experimental and non-experimental methods for impact evaluations (as long as control groups are constructed under reasonable assumptions, see Glewwe, et al. 2011). This review allows a set of studies coverage of which are more comprehensive. However, one downside of this review is we have limited understanding for the cost benefit analysis. To have an understanding of the cost benefit or cost effectiveness analyses we take advantage of an on going analysis for a set of studies that have both more rigorous RCT based evaluations and also detailed cost and effect analysis that are comparable across studies (JPAL 2016).

### 3.3 A Review of the Larger Set of Studies

We group the school interventions aiming increasing (not exclusively) students' test scores (see Figure 8). Similar to the interventions that aim to maximize student enrolment and attendance there are interventions that investment in school infrastructure. However, these interventions aim into physical inputs that go into make the teaching experience more effective. Some examples include distributing textbooks, computer aided teachings, building libraries, among others. Next, there are studies that look into teacher characteristics and training. Additionally, it also includes addressing capacity of leadership by focusing on school principal or headmaster. Lastly, studies also look at class size, additional hours of schooling beyond the regular hours and remedial tutoring etc.

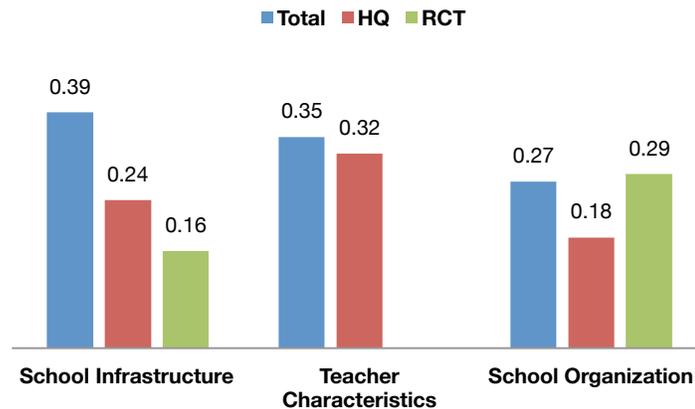
School Infrastructure	Teacher Characteristics	School Organization
<ul style="list-style-type: none"> <li>Textbooks/Workbooks, Desks/Tables/Chairs, Computers/Electricity Game, Electricity, School Infrastructure Index, Blackboard/flip chart, Library, Roof/wall/floor</li> </ul>	<ul style="list-style-type: none"> <li>Teacher education Level, Teacher experience, Teacher knowledge test, Female teachers</li> <li>Teacher training in service, Teacher quality index, Teaching degree, Principal experience, Principal education</li> </ul>	<ul style="list-style-type: none"> <li>Pupil-teacher ratio, Teacher absenteeism, Teacher assigned homework, School meals, Multi-grade teaching, Hours of school day, Tutoring, Salaried teacher, Contract teacher, Expenditure/pupil, Cost of attending, Total school enrollment, Group work, Teacher gives examples, Student attendance</li> </ul>

**Figure 8: Some Stylized Examples of Different Types of Education Interventions**

Source: Glewwe, et al. (2011).

A quick overview suggests that majority of the findings are actually not statistically significant (see Figure 9). For all the studies reviewed by Glewwe, et al. (2011), we find that 39 percent of the estimates (same study can look at multiple outcomes) are positive for the school infrastructure investment while about 35 percent of estimates are effective to increase students' performances that are associated with teacher characteristics. About 27 percent of the estimates show positive impacts for school organization. Restricting to the studies to high quality studies that, among other issues, explicitly take care of the selection issues and carefully construct the control group, we find only about one fourth of the estimates allow us positive impacts at reasonable level of confidence for the interventions that address school infrastructure while it falls to less than one fifth for the interventions that address school organization. The results for the teacher characteristics are not very sensitive between the types of studies. If we further restrict our attention to studies that involve on RCTs then only 16 percent of the estimates allow us positive impacts at reasonable level of confidence for the interventions that address school infrastructure while it falls to less than one fifth for the interventions that address school organization. The results for the teacher characteristics are not very sensitive between the types of studies. If we further restrict our attention to studies that involve on RCTs then only 16 percent of the estimates are positive with reasonable level of confidence. Conditional on the estimates are based on RCTs, the 29 percent of the estimates are statistically significant.

The main takeaway from the vast literature on education interventions is the possible menu of interventions can be considerably vast. We do not report the magnitude of the impacts covered in this section neither we report the cost benefit analyses that can be more useful in guiding the education policies in the coming years. However, it is important to notice that only a minority of estimates suggests statistically significant positive impacts on desirable education outcomes such as test scores and student achievements. Over the last fifteen years, education policies have largely been successful in increase school enrolment and attendance. However, we have limited understanding on how to increase the test scores and eventually competency of the students.



**Figure 9: Percent of Statistically Significant Positive Impacts by Study and Intervention Types**

Source: Glewwe, et al. (2011).

### **3.4 Overview of the Education Interventions based on Limited High Impact Evaluations<sup>8</sup>**

As noted earlier, primary level attendance for the relevant age group has increase considerably and about 90 percent of the primary age children are currently in school. However, the enrolment and attendance do not readily translate into learning and this has becoming a more important issue in the education research and policy literature lately. It can further complement enhancing the demand side interventions as households may find it all the more lucrative to send the children to schools when the student are more credibly gaining the skills they need to be more effective in the labor market by acquiring the necessary competency. We will cluster the studies into five broad categories. We will aggregate the results from the studies to draw conclusion on cost effectiveness analysis by pooling all the studies together.

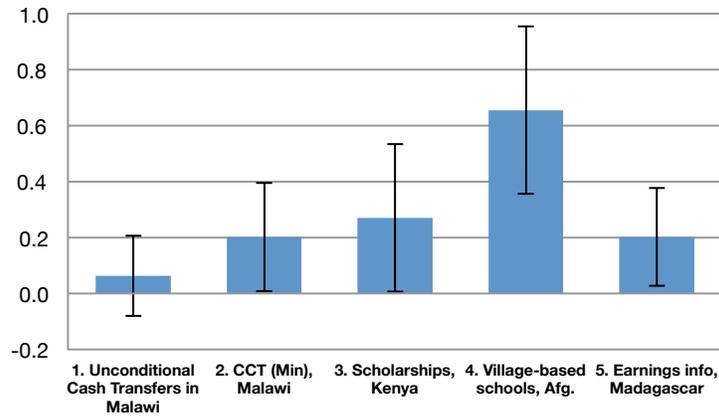
#### **3.4.1 Access to Education**

Since there are considerable variations in the access to education across countries, providing access to education still remains within the education policy agenda. This is specially true for sub-Saharan and conflict ridden countries such as Afghanistan. Not surprisingly there are some evaluations that have aimed just to understand that. Now, this can have more nuance implication for test scores as it is possible that students who less likely to do well in schools compared to the average attendees in the status quo can lower the average test scores. On the other hand if there are geographic variation in resource mobilization it is possible that access to education can increase test score at the extensive margin by extending coverage to the geographically isolated areas.

Empirically we find that providing access to education generally increases students' achievements (see Figure 10). Unconditional cash transfer does not work very well while conditional cash transfer can increase test scores in addition to increase enrolment and attendance in a study carried out in Malawi. We find a similar impact on test scores of providing merit scholarships to girls based on performance in the academic exams. While it is meant to increase school participation by the girls, the merit scholarship also exhibit statistically significant impacts on learning among the targeted beneficiaries in Kenya.

---

<sup>8</sup> This section is primarily based on an on-going cost effectiveness exercise that look into 27 studies that have aimed to increase educational achievement through rigorously designed impact evaluations. The author is grateful the colleagues at JPAL to share their findings, some of which are available online. See JPAL (2016).



**Figure 10: Comparative Impact Analysis for Demand Side Interventions**

Notes: See JPAL (2016) for details.

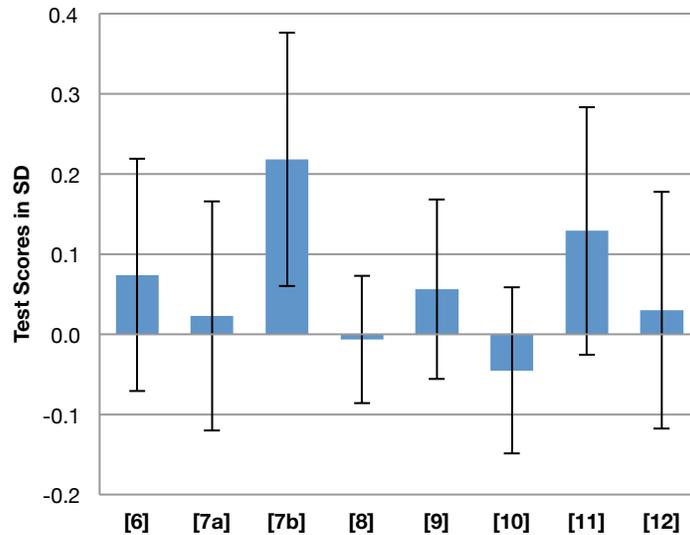
Providing direct access to education through reducing the geographic barrier continues to have significant impacts on students' achievements especially in areas where typically access is low. For example, a study in Afghanistan suggests establishing village schools can increase test scores and this is larger for girls. As a matter of fact, such interventions can narrow the gap in school enrolment between boys and girls, as the impacts are typically larger for girls. Lastly, providing the students, parents and schools about the quantitative information on benefit from education (such as returns to schooling) can be very effective compared to role models can have significant impacts on students achievement as well.

Taken together, we can infer that demand side interventions can continue to play effective roles in increasing students' achievements in addition to increasing the enrolment. This is especially true in areas or regions where school participation is already low because of inadequate availability of schools. While primary schools are more ubiquitous in Bangladesh, it is possible that at the secondary level or beyond policy can incorporate access to education as a possible means to attract students that remain fairly low in countries like Bangladesh.

### 3.4.2 Roles of Conventional Inputs

Next, we look at a set of interventions that target what we can call conventional inputs (see Figure 11). These inputs include more teacher time per student by reducing pupil to teacher ratios, providing textbooks to students, using flip charts, building libraries and grants to school committees. Again the studies are limited to the ones that have strong identifications strategies and explicit cost effectiveness analyses.

The results are somewhat weak for this class of interventions. There is only one intervention that shows statistically significant positive impacts on students' test scores namely providing textbooks to students in Kenya. However, even in this case, the benefits accrue only to students who are in the top quintile based on their pre-intervention test scores, suggesting only good student can reap the benefit of this intervention. However, for the interventions we do not see any discernible impacts that are statistically meaningful.



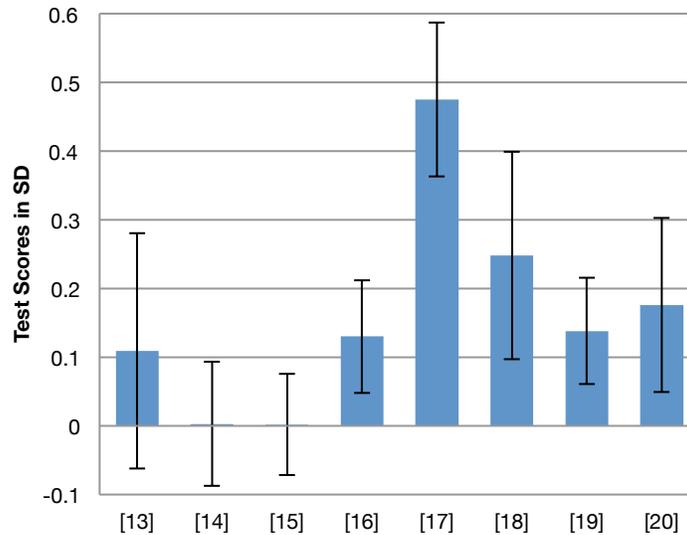
**Figure 11: Impact Assessments of Conventional Educational Inputs**

Notes: Evaluation studies - [6] ETP: Reducing class size, [7a] Textbooks in Kenya, [7b] Textbooks (top 5th) Kenya, [8] Flip charts, Kenya, [9] Reducing class size, India, [10] Building/improving libraries in India, [11] School committee grants in Indonesia, [12] School committee grants in the Gambia. See JPAL (2016) for details.

One should be careful to interpret these results and generalize them to other contexts. For example, in the case of providing textbooks to students in Kenya, it was noted that most of the textbooks were in English, which is sometimes the third language for most of the students. Hence, only better students in the classroom could take benefit from the intervention (Glewwe, Kremer and Moulin, 2009). Similarly, Borkum, He and Linden (2012) argues that provision of additional learning inputs, such as building libraries, may have very limited impacts requiring complementary inputs and interventions during the regular teaching hours.

### 3.4.3 Evaluations of the New Pedagogical Interventions

In addition to the more conventional educational interventions (as discussed in the previous sub-section), many of the recent evaluations have focused on interventions that are somewhat more innovative and possibly less exercised in the developing world context. This includes use of computer aided teaching or smart classrooms. There are two evaluations that have looked into that (one in Colombia and one in Peru, see Figure 12). Adding computers to the classrooms in Colombia show positive and statistically significant impacts on test scores while a similar intervention in Peru does not exhibit any impact on the test scores of the students. This has also been true for many of the interventions in the US that introduced computer to the students. As a matter of fact, introducing computers can even be detrimental to the students if it is not accompanied by complementary inputs such as parental supervision or teachers' guidance.



**Figure 12: Estimated Impacts of New Pedagogical Interventions**

Note: Evaluation Studies - [13] Adding computers to classrooms in Colombia, [14] One Laptop Per Child in Peru, [15] Diagnostic feedback for teachers in India, [16] Read-a-thon, Philippines, [17] Computer Assisted Learning (CAL), India, [18] Extra-Teacher Program (ETP) and streaming, Kenya, [19] Remedial Education, India, [20] Streaming, Kenya. For further details and references, please see JPAL (2016).

The existing evidence suggests that remedial education and tracking or teaching according to the competency of the students can be very effective in increasing students' test scores. One should note that theoretically grouping students according to their ability can potentially be harmful to learning as it deters low achieving students interacting with their better counterparts and reducing the promise of peer to peer learning (Epple and Romano 2011). However, it is increasingly recognized if there are too much heterogeneity in the student body teachers' instructions and educational inputs can render useless unless the teachers can focus their attention and internalize their effort according to the need of the students.

Tracking students with their prior achievement levels can have statistically significant positive impacts on students' test scores. Pedagogical practices by the teachers can improve by pooling students according to their achievement levels or competency in different classrooms. Teaching behavior can respond to quality of the classroom and the response can outweigh the possible benefits of mixing low achieving students with the high achieving peer. The rigorous evaluations from Kenya and India basically support this assertion (see Banerjee, Cole, et al., 2007; Duflo, Dupas and Kremer, 2011). While there are few other outcomes, that show promising impacts on the students' test outcomes, it is reasonable to say that existing evidence suggests innovative applications of pedagogical practices that allow teachers to target students according to their learning abilities making teaching more effective.

### 3.4.4 Teachers' Incentives and Monitoring

In the developing countries, often owing to resource constraints and weak organizations mechanisms are not in place to motivate teachers to create a minimum learning environment for the students. This may manifest through absenteeism. Teachers are often prone to multitask among different responsibilities, some of which are not related to teaching at all. Hence, they may optimize in dimensions that deter delivery of proper education to the pupils.

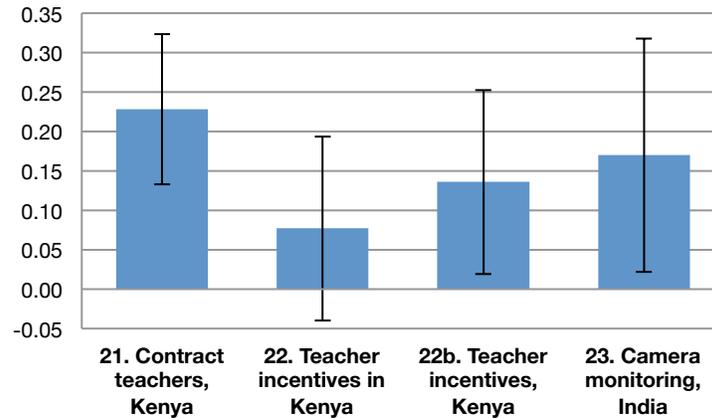


Figure 13: Estimated Impacts of Teacher Accountability

Figure 13 presents impacts of some of the studies that directly address teachers' accountability by focusing on employing contract teachers, providing performance based incentives and direct monitoring. Three out of four interventions exhibit statistically significant positive impacts on students' test scores.

### 3.4.5 Role of Decentralization and Better School Management

One approach to ensure quality education that may allow better learning is to allow competition among the education providers. There is an emphasis on more decentralization in provision of school services and even development partners recognize that. The theoretical model suggests that decentralization can foster reflection of households' or communities' preferences towards education investment. Hence, a more competitive market can ensure efficiency when it comes to provision of education services to a particular community. However, this may also lead to elite capture if the local administration has weak governance capacity and it can certainly exacerbate inequality within and across communities. In other words, there is possibility of inequity-efficiency trade offs while fostering competition and decentralization.

The empirical findings on the effects of decentralization on education outcomes are quite in line with the abovementioned rationalization. Unfortunately, the empirical studies all do not conform to the best identification strategies. However, the results in general suggest that decentralization and delegation of decision making to a more local level generally have a positive impact. Cross-country findings suggest decentralization results in better student outcomes (Galiani and Perez-Truglia, 2013). Within country analyses allow a more varied and nuanced take on this. In almost all studies, even if there are no effects test scores and performances, decentralization of the school management leads to enrollment and retention of students in the schools. While many of the estimates suffer the endogeneity of decision regarding decentralization, a number of

studies from the Latin America (particularly from Argentina, see Galiani, Gertler and Schargrodsky, 2008) suggests decentralization can have causal effects on student test scores (a 3.5 percent increase in math scores and 5.4 percent increase in language tests).

It is important to keep in mind that decentralization entails many different components. The most common denominator for such program is the delegation (this is also a factor in the management practice literature, see (Bloom, Genakos, et al. 2012). Moreover, it can also involve transfer of fund directly to the school (financial autonomy), formation of parents and/or community governing bodies, a greater control of schools' human resources (for example, hiring or firing teachers). These are some of the reasons why the estimated effects vary significantly across studies. Some of the studies also highlight that there is considerable within study impacts and those variations are also consistent with the *ex ante* theorization. For example, Galiani, Gertler and Schargrodsky (2008) shows that the gain in test scores from Argentine decentralization mainly accrued to the non-poor municipalities.<sup>9</sup>

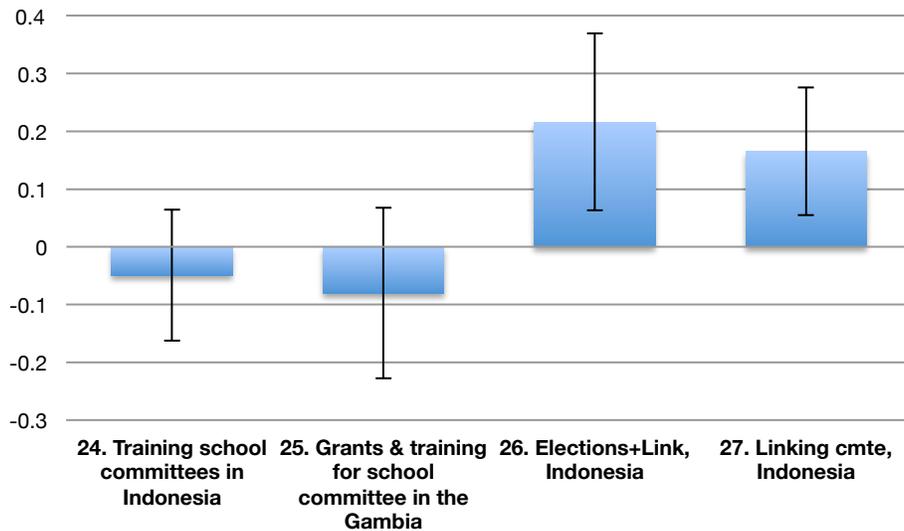


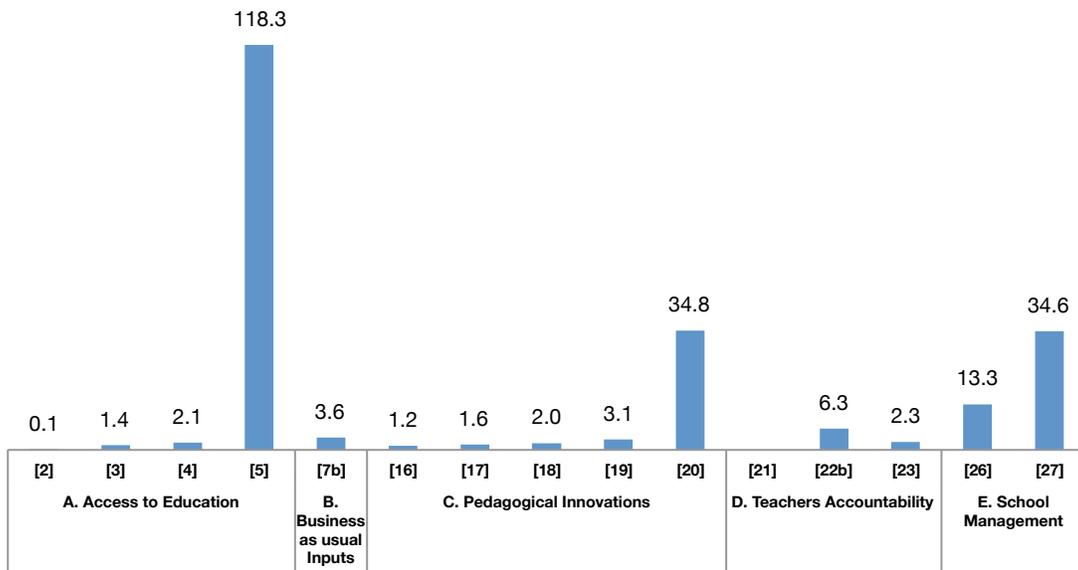
Figure 14: Estimated Impacts of School Governance

### 3.5 Comparative Cost Effective Analysis

For the ECE interventions, we have presented the cost-benefit analyses based on a very limited number of studies implemented in the US and one study from Jamaica. In this section, we will take advantage of a much broader set of studies carried out in a number of different countries across three continents. Full array of benefits accrued from the program is usually not available and benefits of a program may well depend on the society preferences over different benefits that are likely to vary across regions and countries. Also from a narrower sector point of view such cost effectiveness analysis may be more useful because it does not necessary require policy makers to compare programs between two different types of investments (say, education and health, for example). The cost effectiveness analyses will also be based on the common outcomes

<sup>9</sup> Asadullah (2005) has found that greater competition among schools in Bangladesh can improve the students' test performance.

of increasing the student test scores measured in SD of the control group. While students' test scores are definitely an imperfect measure of learning, as long as the measure errors and noise to signal ratios are not group specific, cost-effective analyses should allow us useful guidance to compare importance of different programs. We also restrict ourselves to the programs and interventions that have exhibited statistically significant positive impacts on the students' test scores.



**Figure 15: Cost-Effective Analysis for Selected Impact Studies**

Notes: A. Access to Education: 2. CCT (Min), Malawi, 3. Scholarships, Kenya, 4. Village-based schools, Afghanistan, 5. Earnings info, Madagascar; B. Business as usual Inputs: 7b. Textbooks (top 5th) Kenya; C. Pedagogical Innovations: 16. Read-a-thon, Philippines, 17. CAL, India 18. ETP and streaming, Kenya, 19. Remedial Education, India, 20. Streaming, Kenya; D. Teachers Accountability: 21. Contract teachers, Kenya, 22b. Teacher incentives, Kenya, 23. Camera monitoring, India; E. School Management: 26. Elections+Link, Indonesia, 27. Linking School Committee, Indonesia. See Dhaliwal, et al. (2012) and JPAL (2016) for details.

The cost effectiveness results are presented in Figure 15. The numbers in the figure suggest additional test scores (measured in SD) for every \$100 spent on the associated program. Information dissemination interventions are generally cheaper and reach out to general population more easily. Hence, the effectiveness of such program can be moderate and they continue to be highly cost-effective. Two other programs namely students tracking in Kenya and strengthening governance of the schools in Indonesia also show very cost effective results.

Teachers' incentives and monitoring (accountability in general) can also be quite cost-effective compared to the many other interventions. Teachers' absenteeism continues to be a problem in the developing countries and the right mechanism can certainly be cost-effective in increasing test scores. One particular program actually suggests both reducing costs and increasing students' achievements (Duflo, Dupas and Kremer, 2015). In most developing countries, education system is largely centralized

where teachers are employed by the government. Weak governance often poses the risk of rent seeking by the officials who are entrusted with delivering education and other services. However, such captures are reduced by empowering the school governance and community and parents' involvement in the school management.

This draws a more nuanced picture on how to draw policy conclusions from the wide variety of interventions and programs that have been carried out in very different contexts. Considerable variation in students' achievements across different countries and regions has something that already been well recognized and it is important to understand how different interventions and delivery mechanisms can improve the students' learning experiences. Both providing access to education for regions where school participation is low can improve students' quality. However, increasing the school enrolment and attendance may not necessarily translate into actual learning. In the coming years, policymakers and practitioners in the fields of education need to systematically gather the best evidence through different interventions and programs. Business as usual practices may not deliver the potential educational outcomes that one can hope for.

### *3.6 Cost-Benefit Analysis for "Streaming" Intervention for Bangladesh*

The comparative cost-effective analyses of different education programs show strong potentials for increasing test scores for the students. Among different programs, "streaming" or reassigning students according to their initial achievements have shown promises to increase students' achievement tests in a very cost-effective way in different contexts (particularly in India and Kenya, see Duflo, Dupas and Kremer, 2011). While Figure 15 suggests there are few other interventions that show better cost-effectiveness, I choose streaming or targeting students according to their achievement tests for few reasons. Firstly, information about job market is useful, it may have limited effectiveness beyond short-term and the long-term benefit may still require investing in specific skills of the students. Secondly, Tracking and streaming have a wider appeal and it is already in practice in widely varying contexts (e.g. India, Kenya and other places). Hence, we choose this intervention for our benefit cost analysis.

We link the gain in test scores with labor market outcomes by using estimates of Hanushek and Zhang (2009). In particular, we use 1.97 SD of gain in test scores per one hundred dollars spent on reassigning students according to their achievement level (see Figure 15 and also JPAL 2016). Please note that this is the lowest estimate for such programs among all the studies (see Figure 15). We assume that the \$100 is spent throughout the five years of primary schooling and may also allow for hiring additional teacher(s) at the school. The quality-adjusted schooling can raise the annual earnings of the students by as much as eight percent (see Hanushek and Zhang 2009 for the non-US countries). It should also be noted that there are further variances by gender and we are just taking simple average for the non-US estimates. The gains in annual labor earnings start accruing at age 18 and can last until 50 years of age. As with early childhood education, this is certainly a lower limit for a person's length of active life. We use these two estimates to measure the total discounted benefit and cost. We show the results for different discount values and also different levels of deadweight losses that can be associated with resource transfer.

Our results suggest that there are also considerable gains from investing in school quality. The reassignment of students according to their prior achievements and knowledge levels can have a benefit-cost ratio varying from 4.1 to 14.0 (see Table 2).

The most conservative estimates along with a real social discount rate of 15 percent and deadweight loss of 50 percent put the benefit cost ratio at 4.1. However, a more realistic social discount rate of 9 percent suggest benefit cost ratios in a range of 5.6 to 8.4, depending on the deadweight loss. The ratios are generally lower than early childhood education interventions with a internal rate of return of about 15 percent, still making it worthwhile to invest in education at the primary level to increase the quality of learning of the students.

**Table 2: Benefit Cost Ratios for Investing in School Quality**

		Deadweight Loss (as % of Unit Cost)					
		0%	10%	20%	30%	40%	50%
<b>Discount Rate</b>	<b>3%</b>	14.0	12.7	11.7	10.8	10.0	9.3
	<b>4%</b>	12.6	11.5	10.5	9.7	9.0	8.4
	<b>7%</b>	9.7	8.8	8.1	7.5	6.9	6.5
	<b>9%</b>	8.4	7.6	7.0	6.5	6.0	5.6
	<b>10%</b>	7.9	7.2	6.6	6.1	5.6	5.3
	<b>11%</b>	7.5	6.8	6.2	5.7	5.3	5.0
	<b>13%</b>	6.7	6.1	5.6	5.2	4.8	4.5
	<b>15%</b>	6.2	5.6	5.2	4.8	4.4	4.1

Note: The information on impact of “streaming” test scores is taken from (Duflo, Dupas and Kremer, 2011). The association between test scores or quality adjusted score and annual earnings of workers are from Hanushek and Zhang (2009). The real social discount rates vary from 3 to 15 percent and deadweight losses associated with transfer vary from 0 to 50 percent.

## 4 Professional Skill Formation

### 4.1 Importance of Management Practices in Ensuring Labor Productivity

Similar to test score variations across country and region, the recent literature on firm productivity recognizes that there is a considerable variation in productivity both between countries and also within countries across different sectors and regions.<sup>10</sup> However, it is also increasingly recognized that even within a narrowly defined industry, there are considerable variations between firms and this may even be larger in the developing countries (Syverson 2011, Hsieh and Klenow 2009). As a matter of fact, it can be argued that the low total factor productivity is associated with long tail of low productive firms. Moreover, there are also considerable productivity differentials within firm.

We have limited understanding on what can effectively explain the variation of firm level productivity. However, development agencies have invested heavily on different types of training to the poor and resource constraint individuals or households to either start or extend their existing businesses often tied to other potentially complementary

<sup>10</sup> Bryan, Chowdhury and Mobarak (2014) provides evidence on how financial assistant in the form of either grant or loan can help the poor households to migrate and learn about potential job opportunities in other places. The migrants can learn about potential job opportunities in other, possibly urban, areas and also form professional relationships. Such knowledge capital has been shown to motivate individuals to seek job and increase income and household welfare even in the absence of initial financial incentives.

factors such as access to finance.<sup>11</sup> However, existing literature largely suggests that there is dearth of credible evidence that shows that such business training interventions are effective (McKenzie and Woodruff, 2013). However, a closer look suggests that effectiveness of such training can be increased when such programs lead to actual changes in management practices. Management practices can include employee selection and human resource management, adopting financial discipline in running businesses and access to market in addition to finance (McKenzie and Woodruff, 2015). In some cases, financial access can further lead to trying out different practices that lead to very high return and risk averse individuals may be reluctant to initiate such learning because of the risk.

Professional skill formation can take place in different ways. For example, Lucas (1993) discusses how learning by doing can contribute towards productivity gain with a theoretical model with a motivating example from the ship building industry in the early 20<sup>th</sup> century western US. It can be reasonably assumed that many such learning and skill building takes place within private firms. While this is an important mode, the private motive of such exercises will remain the outside the scope of this paper. Rather we will draw upon some of the recent academic literature that explicitly looks at business training and highlights the importance of managerial capital and its contribution to the total factor productivity (Hsieh and Klenow, 2009; Bloom, Genakos, et al., 2012). Needless to say this gain can be attributed to economic development and nature of its sustainability in the long run.

Academic works that look at business training in the developing country contexts are fairly recent, emerging in the last ten years or so. Such interventions address a very specific condition that is more relevant for the developing country, which is the informal or semi-informal nature of a developing economy. Hence, many business enterprises in the developing countries are single employee owned businesses that show reluctance or lack of capability to grow. Many managerial practices of such small businesses lack some of the elements that are more common for a typical business in the developed country (such as marketing, inventory management and financial practices). Hence, interventions aimed at these businesses address some of these issues.

By restricting ourselves to the evaluation of such business training that have a certain level of rigor in the study design and also given that the academic attention is fairly recent in this area, we have a very limited number of studies that look at managerial capital and its role in firm productivity and profitability. So far the evidence suggests that impacts of such programs are very modest when it comes to change in management practices (0.1 to 0.2 SDs or 5 to 10 percentage points, see (McKenzie and Woodruff, 2013). Hence, very few studies find a positive impact on sales or profitability that can be associated with such trainings. However, for larger firms more intensive and expensive consulting services can increase firm productivity by making simple changes in the way businesses are run in the developing countries (Bloom, Eifert, et al. 2013). Moreover, McKenzie and Woodruff (2015) further shows that training that actually changes the business practices can have robust implications for sales, profitability and

---

<sup>11</sup> One of the earliest program was started by ILO under Start and Improve Your Business program. It claims to train more than 4.5 million trainees in 100 countries. Other bilateral and multi-lateral agencies such as GIZ (formerly known as GTZ), UNCTAD and IFC have also carried similar training programs along with microfinance organization in many different countries. See Mckenzie and Woodruff (2013) for more details.

productivity. However, there are considerable heterogeneity in the impacts depending on sex of the business owner, initial human capital and whether the firms had hired workers or not. Moreover, firms may also lack the confidence on many of the training programs suggesting the lack of demand for such training even if, because of the volume of sales, small gain in productivity can possibly be enough the cost of the training for the firms (Macchiavello, Rabbani and Woodruff, 2015).

#### *4.2 Benefit Cost of a Specific Program in Bangladesh*

For cost benefit analysis, we look at a specific operator training project (OTP). The objective of the program is to train the female operators to become supervisors in ready-made garment factories. The offsite training require the operators to spend six weeks at a training center outside the factory covering production, quality management and human resource related issues. The curriculum was developed by GIZ. The training costs BDT 40,000 itself and the wages of trainees during the training was about BDT 8,000. About 50 percent of the trainees were promoted to supervisor position where they enjoyed a raise of about BDT 4,000. So expected benefit from the project was about BDT 2,000 just from the promotion.

**Table 3: Benefit Cost Ratios for Operator to Supervisor Training Project**

		Deadweight Loss (as % of unit cost)					
		0%	10%	20%	30%	40%	50%
Discount Rate	3%	6.1	5.6	5.1	4.7	4.4	4.1
	5%	5.4	5.0	4.5	4.2	3.9	3.6
	7%	4.9	4.4	4.1	3.7	3.5	3.2
	9%	4.4	4.0	3.7	3.4	3.1	2.9
	10%	4.2	3.8	3.5	3.2	3.0	2.8
	11%	4.0	3.6	3.3	3.1	2.9	2.7
	13%	3.7	3.3	3.0	2.8	2.6	2.4
	15%	3.4	3.1	2.8	2.6	2.4	2.2

Note: Author's calculations from primary data.

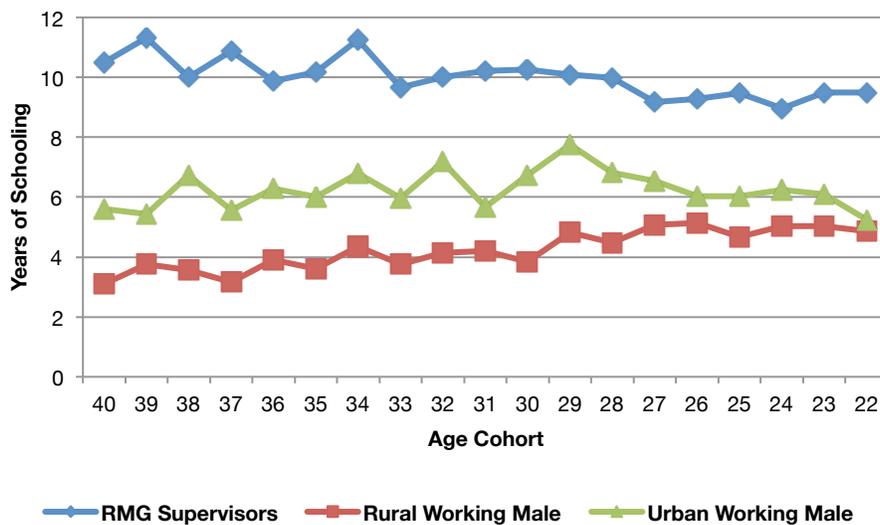
We find that with no deadweight losses and 3 percent discount rate the benefit cost can accrue up to 6.1. Even at more reasonable 10% discount rate the benefit can accrue upto 4.2 for each taka spent on such training program. The internal rate of return for such program is particularly high because for most trainees the promotions take place almost immediately after the training. Programs like this can have important implications as women are rarely assume management roles in manufacturing sector. So such programs can raise the returns for early life educational investment even further raising the school participation by girls (a point made by Heath and Mobarak 2015).

#### *4.3 Importance of Skill Formation for a Robust Private Sector*

Private sector in Bangladesh has generally been robust with some characteristics that are very special to the country. Atypical of many developing countries, Bangladesh has a higher fraction firms that have more than a hundred workers. This is primarily led by the presence of large number RMG factories that employ up to four million workers majority of which are women. However, the over all productivity in this sector is generally low compared to China, India and Sri Lanka, as well as some of the emerging com-

petitors in this sector. The sector often receives attention because of the factory accidents and working conditions.

There are number of recent studies that have looked into this sector and its business practices. One particular issue in this sector is lack of women’s presence in the management position. For example, while about 70 percent of the line operators and helpers are women, only about five percent of the supervisors comprise of female managers and it is almost non-existent at the higher level. This practice sometimes persists because of the perception that women workers or applicants do not have the required technical knowledge to manage a production line. However, recent evidence suggests that this perception can often be wrong and management training for supervisory roles can induce the factories to allow women to work as apprentice in the supervisory roles eventually leading to hire them as full time supervisors (Macchiavello, Menzel, et al. 2015). A simple benefit cost analysis shows that such training can more than make up for the gains in wages within two years on average and within a year for the workers who are actually promoted.



**Figure 16: Education Levels of RMG Supervisors and Working Male Population in Bangladesh**

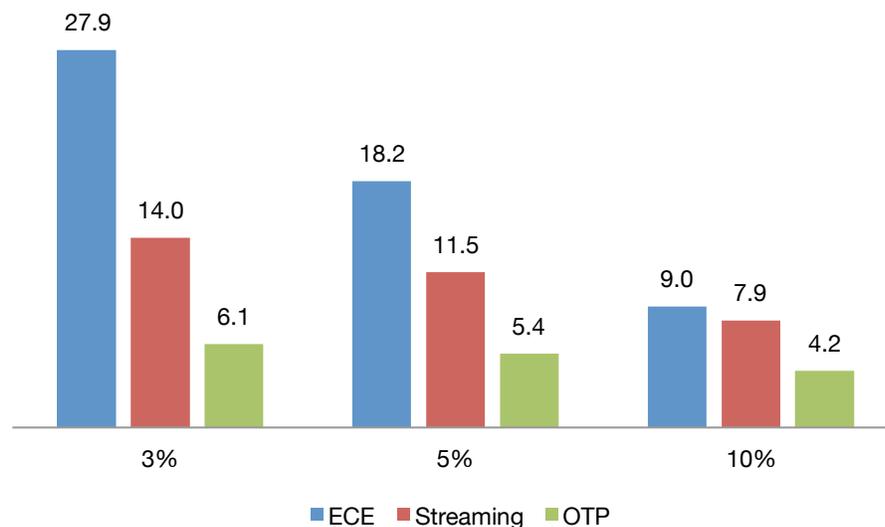
Notes: Data for RMG Supervisors is from author’s own research. Data for rural and urban working men is from Household Income and Expenditure Survey (2010).

We can further see the importance of education and on-the-job training in Figure 16. The top line shows the schooling of a sample of supervisors in RMG factories in Bangladesh. While the average schooling of the supervisors is higher than average working male population in Bangladesh, the required education profile is fairly flat over the age cohorts suggesting the younger cohort is not generally more educated than the older cohorts. As a matter of fact, if we look at the working male over the age cohorts there is a clear declining trend in the level of education among the urban working male population. This further corroborates the urban Bangladesh is probably allowing limited scope for high skilled workers and primarily attracting younger cohorts of workers in the low skilled sector, ready made garment sector being one of them.

This suggests that the new supervisors or managers and urban working population in general may lack job opportunities to reward the high skilled workers. The increase in productivity of the firms through business or professional training can incentivize the workers to accumulate human capital over the life cycle. Such trainings can have larger scope to contribute to the firm productivity and wellbeing of the employees. While benefit cost ratios will certainly be lower compared to the earlier life education investments (as shown in the previous sections), such trainings may be more in line with the firms' incentives. As we will gather more evidence in the coming years from the academic work and rigorous evaluations, we will be able to draw a more complete picture of how professional training can contribute to the economic development of the emerging economies in a more competitive and connected world.

## 5 General Conclusion

Globally, the labor market is fast changing. Because of migration (both economic and political) requires the workers to acquire skills that are more portable and useful to the employers in widely varying contexts. At the same time because of a more globalized market, specialization can have higher returns. But fast pace technology can make a specific set of skills obsolete more quickly compared to the past. As such, it is important that workers and entrepreneurs gather the ability to adopt quickly and life-long learning capacity is important to cope up in such markets. Hence, it is important to recognize the skill formation over a longer period over one's life.



**Figure 17: Comparative Benefit Cost Ratios for Selected Interventions**

Source: Author's calculations. All the analyses assume no deadweight loss in the delivery of the interventions. ECE means early childhood education. OTP means operator training project.

It is important for governments and developing partners to rationalize their decisions regarding scarce resources they have in their disposal to meet competing development needs. This study attempts to understand the returns on investment in different types of education interventions. Because of the very nature of the "production function" of skills, the investment in the earlier period of one's life is more useful because it allows one to learn more effectively at a later stage and earlier investment entails higher re-

turns on investment for the education investment during a later period (see Figure 17). As such early life education should be considered an important policy tool to ensure both personal and national well-being over the coming years. While this is recognized in the policy papers in Bangladesh, the exact resource need is considerable and one needs to carry out careful fiscal exercise to understand the nature of public investment required for that.

It should also be understood that, in the end, parents and guardians make the decision whether and how much investment to make on their children and they will make the optimal decision if the “right” choices are provided to them. This is also important because the impacts or effects of any interventions are likely to be heterogeneous and there many interventions that have exhibited overall positive effects while accruing to households who are better off at the baseline. As a result a well-intentioned but poorly designed intervention can exacerbate the very nature of the income and wealth inequality that the interventions aimed to mitigate in the first place.

I have not carried out the exact resource required to meet the education investment need in Bangladesh. Bangladesh has a demographic bulge in the lower side of the population pyramid and to reap the demographic dividend, it certainly needs to mobilize more resources to the education sector, which now receives barely 1.8 percent of the country’s GDP from the public sector. This is certainly inadequate and recognizing the immense benefit education investment can make for the citizen of this country is very important to recognize. The political will is important to enjoy the economic benefit of education and this paper aspires to stir the discussion towards that.

**Table 4: Summary of benefit cost ratios and recommendations**

Intervention	3% discount rate	5% discount rate	10% discount rate
Psychosocial stimulation for stunted children	27.9	18.2	9.0
Grouping and teaching children according to ability	14.0	11.5	7.9
On the job management training	6.1	5.4	4.2
Computer assisted learning	Average program unlikely to be cost-beneficial		
Provide BAU inputs like textbooks	Average program unlikely to be cost-beneficial		
Improve teacher accountability	Average program likely to be cost-beneficial		
Improve school management	Average program likely to be cost-beneficial, but evidence limited in developing country context; political cost of implementation may be prohibitive.		
Vocational training	Average program unlikely to be cost-beneficial (unless it addresses specific management practices)		

### Works Cited

Asadullah, M Niaz. "The effect of class size on student achievement: evidence from Bangladesh." *Applied Economics Letters* 12, no. 4 (2005): 217-221.

- Attanasio, Orazio P, Camila Fernández, Emla O A Fitzsimons, Sally M. Grantham-McGregor, Costas Meghir, and Marta Rubio-Codina. "Using the infrastructure of a conditional cash transfer program to deliver a scalable integrated early child development program in Colombia: cluster randomized controlled trial." *BMJ* 349 (2014): g5785.
- Banerjee, Abhijit V, Shawn Cole, Esther Duflo, and Leigh Linden. "Remedying Education: Evidence from Two Randomized Experiments in India." *The Quarterly Journal of Economics* 122, no. 3 (2007): 1235-1264.
- Banerjee, Abhijit V, Shawn Cole, Esther Duflo, and Leigh Linden. "Remedying Education: Evidence from Two Randomized Experiments in India." *The Quarterly Journal of Economics* 122, no. 3 (2007): 1235-1264.
- Behrman, Jere R, Yingmei Cheng, and Petra E Todd. "Evaluating preschool programs when length of exposure to the program varies: A nonparametric approach." *Review of economics and statistics* 86, no. 1 (2004): 108-132.
- Berlinski, Samuel, Sebastian Galiani, and Marco Manacorda. "Giving children a better start: Preschool attendance and school-age profiles." *Journal of public Economics* 92, no. 5 (2009): 1416-1440.
- Berlinski, Samuel, Sebastian Galiani, and Paul Gertler. "The effect of pre-primary education on primary school performance." *Journal of public Economics* 93, no. 1 (2008): 219-234.
- Bernal, Raquel, and Camila Fernández. "Subsidized childcare and child development in Colombia: Effects of Hogares Comunitarios de Bienestar as a function of timing and length of exposure." *Social Science & Medicine* 97 (2013): 241-249.
- Bloom, Nicholas, Benn Eifert, Aprajit Mahajan, David McKenzie, and John Roberts. "Does Management Matter? Evidence from India." *Quarterly Journal of Economics* 128, no. 1 (2013): 1-51.
- Bloom, Nicholas, Christos Genakos, Raffaella Sadun, and John Van Reenen. "Management Practices across Firms and Countries." *Academy of Management Perspectives* 26, no. 1 (2012): 12-33.
- Borkum, Evan, Fang He, and Leigh L Linden. "The Effects of School Libraries on Language Skills: Evidence from a Randomized Controlled Trial in India." No. w18183, National Bureau of Economic Research, 2012.
- Bryan, Gharad, Shyamal Chowdhury, and Ahmed Mushfiq Mobarak. "Underinvestment in a profitable technology: the case of seasonal migration in Bangladesh." *Econometrica* 82, no. 5 (2014): 1671-1748.
- Dhaliwal, Iqbal, Esther Duflo, Rachel Glennerster, and Caitlin Tulloch. *Comparative cost-effectiveness analysis to inform policy in developing countries: a general framework with applications for education*. Cambridge, MA: Abdul Latif Jameel Poverty Action Lab (J-PAL), 2012.
- Duflo, Esther, Pascaline Dupas, and Michael Kremer. "Peer effects, teacher incentives, and the impact of tracking: Evidence from a randomized evaluation in Kenya." *American Economic Review* 101, no. 5 (2011): 1739-1774.
- Duflo, Esther, Pascaline Dupas, and Michael Kremer. "School governance, teacher incentives, and pupil-teacher ratios: Experimental evidence from Kenyan primary schools." *Journal of Public Economics* 123 (2015): 92-110.
- Duncan, Greg J, Jens Ludwig, and Katherine A. Magnuson. "Reducing poverty through preschool interventions." *The Future of Children* 17, no. 2 (2007): 143-160.

- Edlund, Calvin V. "The effect on the behavior of children, as reflected in the IQ scores, when reinforced after each correct response." *Journal of Applied Behavior Analysis* 5, no. 3 (1972): 317-319.
- Education Watch 2013: New Vision Old Challenges The State of Pre-primary Education in Bangladesh*. Dhaka, Bangladesh: Campaign for Popular Education (CAMPE), 2014.
- Elango, Sneha, Jorge Luis García, James J Heckman, and Andrés P Hojman. *Early Childhood Education*. Vol. 2, in *Economics of Means-Tested Transfer Programs in the United States*, by Robert Moffitt. Chicago, IL: University of Chicago Press, 2016.
- Epple, Dennis, and Richard Romano. *Peer Effects in Education: A Survey of the Theory and Evidence*. Vol. 1B, in *Handbook of social Economics*, 1053–1163. Amsterdam: North-Holland, Elsevier, 2011.
- Estes, Annette, et al. "The impact of parent-delivered intervention on parents of very young children with autism." *Journal of autism and developmental disorders* 44, no. 2 (2014): 353-365.
- Frey, Carl Benedikt, and Michael A Osborne. "The future of employment: how susceptible are jobs to computerisation." 2013. [http://arche.depotoi.re/autoblogs/wwwinternetactunet\\_8a3fe3331e0ad7327e18d9fe6ec3f0ad04dcea58/media/3722fa7d.The\\_Future\\_of\\_Employment.pdf](http://arche.depotoi.re/autoblogs/wwwinternetactunet_8a3fe3331e0ad7327e18d9fe6ec3f0ad04dcea58/media/3722fa7d.The_Future_of_Employment.pdf) (accessed 6 19, 2015).
- Galiani, Sebastian, and Ricardo Perez-Truglia. "School management in developing countries." In *Education Policy in Developing Countries*, by Paul Glewwe. Chicago, IL: University of Chicago Press, 2013.
- Galiani, Sebastian, Paul Gertler, and Ernesto Schargrotsky. "School decentralization: Helping the good get better, but leaving the poor behind." *Journal of Public Economics* 92, no. 10 (2008): 2106-2120.
- Gertler, Paul, et al. "Labor market returns to an early childhood stimulation intervention in Jamaica." *Science* 344, no. 6187 (2014): 998-1001.
- Glewwe, Paul W, Eric A Hanushek, Sarah D Humpage, and Renato Ravina. "School resources and educational outcomes in developing countries: A review of the literature from 1990 to 2010." No. w17554, National Bureau of Economic Research, Cambridge, MA, 2011.
- Glewwe, Paul, and Edward Miguel. *The impact of child health and nutrition on education in less developed countries*. Vol. 4, in *Handbook of development economics*, by T P Schultz and J Strauss, 3561-3606. Amsterdam: North-Holland, 2008.
- Glewwe, Paul, Michael Kremer, and Sylvie Moulin. "Many children left behind? Textbooks and test scores in Kenya." *American Economic Journal: Applied Economics* 1, no. 1 (2009): 112-135.
- Grantham-McGregor, Sally, et al. "Developmental potential in the first 5 years for children in developing countries." *The lancet* 369, no. 9555 (2007): 60-70.
- Hamadani, Jena D, et al. "Cognitive deficit and poverty in the first 5 years of childhood in Bangladesh." *Pediatrics* 134, no. 4 (2014): e1001-e1008.
- Hanushek, Eric A, and Lei Zhang. "Quality-consistent estimates of international schooling and skill gradients." *Journal of Human Capital* 3, no. 2 (2009): 107-143.
- Heckman, James J. "Schools, skills, and synapses." *Economic inquiry* 46, no. 3 (2008): 289-324.
- Hsieh, Chang-Tai, and Peter J Klenow. "Misallocation and Manufacturing TFP in China and India." *The Quarterly Journal of Economics* 124, no. 4 (2009): 1403-1448.

- JPAL. *Increasing Test Score Performance: What interventions are most effective at increasing student learning?* 2016. <https://goo.gl/r1h7cL> (accessed 1 29, 2016).
- Leroy, Jef L, Paola Gadsden, and Maite Guijarro. "The Impact of Daycare Programs on Child Health, Nutrition and Development in Developing Countries: A Systematic Review." *3ie Systematic Reviews*, The International Initiative for Impact Evaluation (3ie), 2011.
- Lucas Jr, Robert E. "Making a Miracle." *Econometrica* 61, no. 2 (1993): 251-272.
- Macchiavello, Rocco, Atonu Rabbani, and Christopher Woodruff. "The Market for Training Services: A Demand Experiment with Bangladeshi Garment Factories." *American Economic Review: Papers & Proceedings* 105, no. 5 (2015): 300-304.
- Macchiavello, Rocco, Andreas Menzel, Atonu Rabbani, and Christopher Woodruff. "Challenges of Change: An Experiment Training Women to Manage in the Bangladeshi Garment Sector." Unpublished manuscript, 2015.
- McKenzie, David, and Christopher Woodruff. "Business Practices in Small Firms in Developing Countries." Working Paper No. 21505, NBER, 2015.
- McKenzie, David, and Christopher Woodruff. "What are we learning from business training and entrepreneurship evaluations around the developing world?" *The World Bank Research Observer* 29, no. 1 (2013).
- Michel, Wolfgang. "Medicine and Allied Sciences in the Cultural Exchange between Japan and Europe in the Seventeenth Century." In *Theories and Methods in Japanese Studies. Current State & Future Developments. Papers in Honor of Josef Kreiner*, by Hans Dieter Ölschleger, 285-302. Göttingen: Vandenhoeck & Ruprecht Unipress, 2007.
- Mostafa, Romel, and Steven Klepper. "Industrial development through tacit knowledge seeding: evidence from the Bangladesh garment industry." 2010. <http://goo.gl/k6Jiz3> (accessed 3 13, 2016).
- Petrosino, Anthony, Claire Morgan, Trevor Fronius, Emily Tanner-Smith, and Robert Boruch. "Interventions in Developing Nations for Improving Primary and Secondary School Enrollment of Children: A Systematic Review." *Campbell Systematic Reviews* 8, no. 19 (2012).
- Plan Bangladesh. *Child Marriage in Bangladesh: Findings from a National Survey 2013*. Dhaka: Plan Bangladesh, 2013.
- Raihan, Selim, and Bazlul Haque Khondker. "Estimating the economic impacts of the Padma bridge in Bangladesh." MPRA, Munich Personal RePEc Archive , 2010.
- Schweinhart, Lawrence J. *Significant Benefits: The High/Scope Perry Preschool Study through Age 27*. Ypsilanti, MI: High/Scope Educational Research Foundation, 1993.
- Syverson, Chad. "What Determines Productivity?" *Journal of Economic Literature* 49, no. 2 (2011): 326-365.
- Zoritch, Bozhena, Ian Roberts, and Ann Oakley. "Day care for pre-school children." *Cochrane Database of Systematic Reviews*, no. 3 (2000).