Learning in Liberia: Mid-Year Gains in Literacy and Numeracy

A Pilot Study on Bridge Partnership Schools for Liberia (PSL)

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With a foreword by George Werner, Minister of Education, Government of Liberia

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REPUBLIC OF LIBERIA
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WEST AFRICA

7 April 2017

Dear Colleagues,

That the educational system in Liberia is faced with serious challenges, which threaten the country's drive to build a strong human capital base, is not an understatement. As Minister of Education, it is my responsibility to change the status quo, and innovate towards a better future for Liberia's children.

I had a vision for transformational public schools in every district across the country, providing access to every child. I started a rigorous review of all partners in our education sector in Liberia. While we have many leaders who have dedicated their lives to improving opportunity for children through learning, we did not have any organizations working in Liberia who had demonstrated that they could truly improve learning for children—and not at only one or two schools, but at dozens or hundreds. I was looking for solutions that could lead all 2,750 of our primary schools to "Get to Best." In late 2015, I had the opportunity to visit many organizations working in East Africa, to learn from what was working on the other side of our great continent. I learned a great deal from the organizations I was privileged to spend time with, including Educate! and others.

One organization stood out for so obviously demonstrating that even under circumstances of limited budgets and in rural areas, children could have access to a school where learning happened every day. When I visited 5 schools managed by Bridge International Academies in Uganda, I was amazed by what I saw: kindergartners were reading and doing math far above their grade level; fifth graders were doing high quality reading and writing in rigorous lessons; and a whole school network composed of talented teachers were teaching consistent, high-quality lessons to students who were not very different from those for whom I work in Liberia. I was convinced that in Liberia our public schools could be doing more than we had thought, and more than we had yet done.

I returned home with a vision, which I shared with the President of Liberia and which she strongly endorsed: to create a program with the ambitious goal of dramatically improving the quality of free ECE and primary education across Liberia through strong partnerships with non-governmental providers. Just one short year ago, the Ministry of Education launched the pilot phase of what we named the "Partnership Schools for Liberia" program, and we invited eight operators to support 94 public primary schools across the country. Originally, we had invited Bridge to support 50 public ECE and primary schools. We then decided to engage a randomized control trial to provide the government with "gold standard" evidence of learning, and this limited the Bridge "treatment" support to 24 schools and retained other public schools under the Ministry's direct management as our "control." Public demand for what they were observing in the free public schools supported by Bridge was so strong, that the MOE assigned a 25th school in November. Bridge Partnership Schools for Liberia now serves nearly 9,000 students in 25 free public schools across eight counties.

In an effort to provide early evidence of how government partnerships could advance children's learning, the Ministry partnered with Bridge, Pencils of Promise, and the University of Liberia to commission a study on the learning of children in 6 free public schools managed by Bridge in the Partnership Schools for Liberia program and 6 matched public schools not in the PSL program. The study compares student performance at a baseline in September-October and a midline in January. An end-line assessment will be held in June-July, with a final report released shortly thereafter. This study only included Bridge PSL public schools as Bridge was selected to work in the government partnership a few months before the other Partnership Schools for Liberia organizations were selected.

The findings of the midline report are both exciting and encouraging. They show that students in Bridge Partnership Schools performed better academically than their peers in traditional public schools, across nearly every literacy and numeracy metric tested, and over a short period of time. Full school days with more instructional time on core content, teacher training and monitoring, standards-aligned learning materials, a technology-enhanced teacher guide delivery system, and other elements of school organization appear to contribute to the positive results from these in these free public schools supported by Bridge PSL.

Perhaps most importantly, many of these aspects could be implemented in traditional public schools, providing us with plausible models for improving all public schools across the country. This also points to the benefits of continuing the Partnership Schools for Liberia program, and continuing to see how organizations can work with the MOE to strengthen individual schools, as well as our entire system.

It is my hope that you will find the report useful in your assessment of the progress that the Government of Liberia is making to provide quality, free education to all our children.

Sincerely,

George Kronnisanyon Werner
Minister of Education, Republic of Liberia

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1. Executive Summary

Bridge International Academies opened 25 PSL public schools in 8 different counties across Liberia in September 2016. To better understand how Bridge PSL public schools can drive educational gains, the Ministry of Education, Pencils of Promise, University of Liberia, and Bridge embarked upon "The Bridge PSL Public School Pilot Study". This study compares performance for students attending Bridge PSL public schools with those in comparable traditional public schools.

Even at this early date, we observe clear performance differences. After receiving just four months of instruction, Bridge students in the early grades show demonstrably superior reading and math skills compared to their counterparts in traditional public schools. Bridge students read faster and with greater accuracy. Bridge students also solve basic math problems faster.

It will be some time before we will know the full impact of a Bridge education, but these initial findings suggest that students in Bridge PSL public schools are learning better and faster than their peers. If this trend continues, it will mean that Bridge students will be much better equipped to face the increasing demands of secondary school and college than their traditional public school peers.

The full report provides all relevant technical details, but a brief overview of the study and its measures will be helpful. The study measured performance with standard, widely used reading and math tests, suitable for assessing progress in the earliest years of formal education. The analysis focuses on student learning growth and compares the gains made by students in Bridge PSL and traditional public schools. Bridge PSL public schools in this pilot study were randomly selected from those six counties in Liberia hosting both Bridge PSL and traditional public schools. Comparison schools were selected based on similarity and proximity to the Bridge PSL public schools. Students at all schools were randomly chosen to participate.

It is important to note that the goal of this study is to provide some indication of the relative benefits that accrue to Bridge students. This study is not meant to definitively determine the impact of Bridge schooling. An impact study of the PSL programme, led by Center for Global Development economist Justin Sandefur and Innovations for Poverty Action, is underway and will produce a mid-line report in late summer 2017. This pilot study, unlike an impact study, favors rapid response over precision and certainty. The tradeoffs that impair precision and certainty, such as its small sample size, the use of a nonrandom comparison group of schools, and a sizable student attrition rate, are also the features of this study that reduce time and cost and make possible to produce a rapid, if incomplete, performance comparison.

Despite these limitations, we are encouraged by this early positive signal of impact on learning outcomes. In June and July 2017, we will return to the same 12 schools to conduct our final round of assessments to measure the growth of students at Bridge PSL public schools vs. traditional public schools. The MOE and Bridge PSL public schools look forward to continuing this partnership in working to improve learning and the opportunity that brings for the students of Liberia.

2. Introduction

This report is a collaborative effort by the Ministry of Education of the Government of Liberia, Pencils of Promise, University of Liberia, and Bridge to measure the effect of Bridge PSL public schools – the educational gains made by students attending Bridge PSL public schools, above their academic peers at traditional public schools. This report describes the learning gains of students in the first semester.[1]

[1] The final report, to be published in August 2017, will describe the learning gains of students after one school year.

This report is organized as follows: First, in Section 3, we discuss briefly the Partnership Schools for Liberia (PSL) program and the Bridge approach towards improving educational quality. We also describe Bridge PSL's first semester of operations.

In Section 4, we describe the data collection efforts that serve as the foundation of this study, including school participation and student sampling, instruments used, and field team development and monitoring.

In Section 5, we discuss the characteristics of the students and schools in our study, beginning with a comparison of student characteristics and assessment scores at baseline, by school type. We then review the findings of school surveys conducted during our midline round of data collection.

Section 6 dives into the results of our midline assessments. We examine results from a panel data analysis of student performance and explain Bridge's impact on academic achievement. We discuss relative gains in literacy and numeracy and how that translates into an effect size.

Section 7 compares Bridge PSL public school students' performance to benchmarks set in Liberia for early grade reading.

Finally, one of the limitations of the pilot study, sample attrition, is discussed in Section 8. Section 9 concludes with our next steps.

3. Background and Context

3.1 The PSL Public Schools Program

The Partnership Schools for Liberia (PSL) program is a bold initiative developed in 2016 by the Government of Liberia to increase the quality of pre-primary and primary education in the country. Specifically, the Ministry of Education invited Bridge and seven other non-state operators to bring their management and operational models to existing public schools nationwide. These schools were randomly selected and assigned to the operators by a team of independent researchers, with each operator supplying feasibility criteria ex-ante. Operators are to receive funding on a per-student basis, but can supplement their budget through individual fundraising. In exchange, operators are responsible for the daily management of the schools and are held accountable to the Government of Liberia for their performance across several indicators.

PSL public schools do not charge fees and students are enrolled on a first-come, first-served basis. PSL public school buildings remain under the ownership of the Government of Liberia, and teachers in PSL public schools are employed by the government. Each operator is given limited autonomy to run schools and improve upon student achievement, as long as they do so in keeping with the regulations of the Ministry of Education and the Liberian national curriculum. Teachers remain civil servants, cannot have their employment terminated by operators, and continue to be paid through the Ministry of Education. Operators are encouraged to supplement the curriculum with remedial programs, a focus on literacy and numeracy, longer school days, and non-academic activities.

3.2 The Bridge Approach

Bridge has developed systems and processes integrated with innovations in technology to ensure that every student receives a high-quality education. Bridge believes that this relies on dedicated and trained teachers, engaging lessons paired with effective learning materials, and monitoring and support designed to create a safe environment for learning. In short, Bridge treats education as a science, where decisions rely on data to drive continuous improvements in training, materials, timetabling, and management.

Here, we identify components of Bridge's approach in this pilot year of working in Liberia's public schools, which we believe may result in improvements in education quality, and compare it with the status quo in typical Liberian schools:

Table 1. Features of Bridge PSL Public Schools vs. Traditional Public School

Category	Bridge PSL Public Schools	Typical Traditional Public School
Length of School Day	• 8:00 am-3:15 pm for students • 7:30 am-3:30 pm for teachers	• 8:00 am – 12:30 pm for students and teachers
Instructional Materials, Guides, Teacher Technology	• Follows national curriculum (all lessons approved by the MoE Department of Instruction). • Teacher guides via the Teacher Computer (every day, every lesson, every teacher). • Lessons designed to provide independent and group practice, emphasizing a "productive struggle".	• Follows national curriculum. • No teacher guides. • Lessons usually involve rote lecture, or students copying content off the board.
School Location & Building Characteristics	• Required certain school characteristics: one physical classroom per teacher/class of students, one teacher per class of students, data signal (2G access), proximity to a road.	• Doesn't necessarily have data signal; not necessarily close to a road.
Class Organization	• Grades not combined. • Maximum class size of 55[2] • Early childhood is designed for younger students aged 3-6. • Over-age children placed into classes that are as age-appropriate as possible, with built-in accelerated learning program to allow for quicker mastery of grade level content.	• Grades often combined due to staffing shortage. • No maximum size[2] • Over-age children (older than 6) are often placed in early childhood classes.
Selection of Administrators & Teachers	• Teachers vetted by Bridge for competence, buy-in, and reputation in their community. • 1 teacher for each grade offered. • 2 administrators—a Principal and a Vice Principal for Instruction, per MoE standards. • 15% of teachers are community teachers who were already teaching at that Bridge PSL public school in previous years; the remainder of teachers are civil service employees who have graduated from a government teacher training institute.	• Teachers not usually assessed for competence or diligence, though a recent MoE initiative is seeking to change this by testing all teachers for basic literacy and enacting biometric checks on presence.[3] • Most schools lack an assigned teacher for 1 or more grade levels; some schools have 1 or more assigned teachers who have absconded from their posting. • No uniform numbers of administrators or standardized job functions. Some administrators serve as full-time teachers; some have absconded from their posting. • Most teachers are civil service employees who have graduated from teacher training institute at some point.

[2] At traditional public schools, desk shortages are common and often children sit on the floor. Bridge purchased more than 1,000 3-seater desks to enable more children to sit in desks and these desks were delivered to schools from November 2016 to April 2017, though many children still sit on the floor.

[3] Liberia Teacher Training Program II (LTTP II). Retrieved online at https://www.fhi360.org/projects/liberia-teacher-training-program-ii-lttp-ii

Category	Bridge PSL Public Schools	Typical Traditional Public School
Teacher Training	• 13-day pre-service training in addition to teacher training institute coursework. Topics covered include: mastering core content, use of classroom management techniques, teaching practice using Teacher Computer. • Teachers receive continuing support during the school year: daily messages about how to improve practice, daily observations from their Vice Principals of Instruction, and regular feedback on how to improve from regional supervisors.	• Most teachers received teacher-training institutes' year-long training, which focuses more on how to create lesson plans. Training also includes a practicum in actual schools, but with little oversight. Some teachers—including the entire teaching staff at some more rural schools—are community teachers who were never formally trained. • No continuing training after initial certificate.
Teacher Monitoring	• Teacher attendance tracked via smartphone. • School administrators are present to take school inventory, communicate with HQ, and provide general support to teachers.[4] • Teachers recognized for success through celebratory notes sent to staff, personal acknowledgement by school administrators and visiting HQ staff, and other methods to recognize and incentivize performance. • Liberian law used to transfer teachers out of a Bridge PSL public school if repeatedly absent or repeatedly neglectful of duties as is allowed according to the Civil Service Administration.	• Teachers attendance rarely monitored, although MOE biometric program starting to change this through matching biometrics to payroll. • Schools are visited by regional MoE staff occasionally. • Methods of teacher recognition unknown, likely vary from school to school. • Liberian law is infrequently or never used to remove and replace consistently absent or underperforming teachers.
Teacher Attendance	• Teacher attendance is closely monitored, with warning letters sent to teachers for absenteeism.	• Teacher attendance is rarely monitored and typically low.[5]
Administrator Roles & Responsibilities	• Defined roles for two administrators: Principal and Vice Principal of Instruction. • Principal in charge of parent and student engagement, building maintenance, and all personnel; accountable for total management and performance of school, including instructional leadership. • Vice Principal reports to the principal; supports teachers through instructional coaching and ensuring presence of Academic materials.	• Principal and Vice Principal role unclear. • Other Vice Principal roles also present. • A daily "sign in book" is used to help monitor staff.
Administrator Attendance	• Both administrators generally present.[6] • Vice Principal is a full-time role with specific trained duties.	• Principal commonly absent. • Vice Principal usually present – but teaching (due to staff shortage).
School Materials	• All textbooks, homework and classwork books provided to students free of charge. • Parents supply exercise books for notetaking and pencils. • In pilot year, a free uniform is provided to every enrolled child.	• In some schools, certain English and Maths textbooks for some grades purchased through MOE GPE funds are available. At schools without GPE textbooks or for other subjects, textbooks are purchased by parents, or child does may not have access. There are no homework and classwork books.

[4] Bridge is currently implementing a program whereby school administrators conduct 2 daily observations of teachers to provide coaching feedback, and monitor whether that feedback is implemented in practice.
[5] Mulkeen, A. (2009). *Teachers in Anglophone Africa*. World Bank.
[6] Attendance has averaged ~90% across all Bridge PSL public schools.

Category	Bridge PSL Public Schools	Typical Traditional Public School
		• Parents supply exercise books for notetaking and pencils. • Parents purchase a mandatory uniform for each child.
School Culture	• School administration trained to focus on positive discipline and student safety throughout the school. • All schools start the day with a student-led devotion in which all children line up and prepare for classes. • Positive school culture reinforced through grand opening ceremonies, PTA meetings, Liberia-created energizing "cheers" and songs in each class, character boards, and student leaders.	• School culture is inconsistently defined; some schools have stronger school culture thanks to a strong principal, some do not. • Some sort of devotion is often a part of school culture.
Student Body and Placement	• No selection for students. • All previous students had priority; Bridge took any additional interested students from the community. • All students evaluated for literacy; placed in appropriate grades by competency and age.	• No selection for students. • No systematic evaluation; children placed based on Principal perception.
Student Attendance	• Attendance tracked through teacher computers. • Attendance also confirmed through calls to principals twice a week. • Teachers and principals encourage students to attend, and hold PTA meetings with S&C to address challenges to attendance at schools.	• Attendance is rarely tracked in a systematic way.
Monitoring & Operational Support from Central Office	• Support provided on Academics, Community Engagement, IT, HR, Supply Chain by central office. • Academic Field Team visits multiple schools daily, with the typical school receiving a visitor every 1 week or 1.5 weeks. • Regional Instructional Managers and Academic Field Officers visit 3 times per month: Observe lessons, support Vice Principals for Instruction and coach teachers. • School and Community Support Team visits 2 times per month: Support principals and engage in proactive outreach to communities and PTAs. • IT Support Team Visits 1 times per month, or whenever needed: Ensure that technology at schools is functioning, and fix any problems that arise.	• Monitoring provided by District Education Officers. • Anecdotally, monitoring is low. • The typical DEO is assigned on average 44 schools to monitor across their district.
Special Programs & Partnerships	• Some schools receive school feeding from NGOs Mary's Meals or the World Food Program, in accord with longstanding arrangements at those schools. • Worldreader and Pencils of Promise Partnership: 18 e-readers for 55 kids (each child gets 45 minutes of reading per day).	• Some schools receive school feeding from NGOs Mary's Meals or the World Food Program, in accord with longstanding arrangements at those schools. • Some schools have other partnerships with local NGOs, including libraries or other learning interventions.

3.3 Becoming Bridge PSL Public Schools

The process of Bridge's entry into Liberia schools spanned 6 months, from April 2016 to September 2016.

1. **School Visits:** Developing the Bridge model in Liberia began in April 2016, when Bridge staff members with the support of Ministry officials visited over 140 schools across 9 counties to meet teachers and identify plausible sites to begin operations.

2. **Vetting School Personnel:** In June and July 2016, Bridge staff deployed Ministry-approved vetting tools to identify which teachers were present at schools, which were absent, and which were likely to struggle with teaching students due to limited literacy and numeracy skills.

3. **Talent Identification:** Bridge staff also deployed the same vetting tools to identify young graduates of the Rural Teacher Training Institutes (RTTIs) in Liberia, who could take the place of absent teachers in Bridge PSL public schools.

4. **School Selection:** The Ministry of Education authorized the external evaluation team of the greater PSL public schools program to randomly select 23 public schools to become Bridge PSL public schools across 8 counties in mid July 2016 (and therefore in the treatment group of the PSL public schools Randomized Control Trial), and one additional school to serve as a "demonstration school" in Monrovia for a total of 24 Bridge PSL public schools.[7] At the request of the Chair of the Senate Education Committee, one additional Bridge PSL public school opened in mid-November, also outside of the treatment group, bringing the total count of Bridge PSL public schools to 25.

5. **Training:** In August 2016, Bridge conducted a 13-day pre-service training of over 330 teachers who had passed these vetting tests. Bridge training is based more on practice and data-driven interventions than on pedagogical theory; Bridge focuses how to use its specific resources and to focus on its "Big 4 ideas about Bridge Teaching." Those ideas are:
    a. Follow the lessons and scope and sequence developed by Bridge's resource development team.
    b. Check on every student's performance.
    c. Respond with clear written feedback, every time.
    d. Motivate all students to behave and try hard.

6. **Assets to Support Learning:** Bridge delivered over 29,000 textbooks, 435 student e-readers, 259 teacher computers, and 9,000 student uniforms to schools.

7. **Placement Tests:** The most rigorous research in education to date has shown that teaching at the right level produces the largest gains in learning outcomes for students.[8] In keeping with this research, in late August 2016, teachers returned to schools and welcomed back students from previous years with placement assessments. These assessments were designed to identify the correct grade level for each child, based on their reading ability and their age. In accordance with Bridge's agreement with the Ministry of Education (and also with Bridge's own strong beliefs), placement tests are never used to reject children from school, but rather to place them in a grade that will serve them best.

[7] Two examples are: Bannerjee, Abhijit, et al. "Mainstreaming an Effective Intervention: Evidence from Randomized Evaluations of 'Teaching at the Right Level' in India." *J-Pal Abstract,* August 2013. Retrieved online at https://www.povertyactionlab.org/sites/default/files/publications/TaRL_Paper_August2016.pdf; and Duflo, Esther, et al. "Peer Effects, Pupil-Teacher Ratios, and Teacher Incentives in Kenya." *J-Pal Abstract,* 2005-2007. Retrieved online at https://www.povertyactionlab.org/node/1131.

8. **First Day and Onward:** On September 5, 2016, Bridge PSL public schools in Liberia opened their doors to students for the first day of lessons.
    a. In all 25 Bridge PSL public schools, lessons are to run from 8:00-3:15 pm, with teachers arriving by 7:30 am to "sync" their teacher computers and prepare their classrooms and lessons for the day ahead.
    b. The Bridge PSL public school is a place of focused, happy learning. Teacher guides and textbooks, developed in tandem for every instructional period of every day for every grade, are designed to shift away from rote lecture (the status quo in most Liberian schools, and schools across much of Africa) and towards opportunities for students to engage in independent and group practice, and to do the "heavy lifting" that generates thinking and learning.

3.4 Operations in the 1st Semester

On July 15, 2016, Bridge received school assignments from the Ministry of Education through its PSL public program. With one month to enrollment (August 15th), the Bridge team proceeded full speed ahead to bring the Bridge model to 24 schools across 8 counties. The first day of school was September 5th.

Bridge PSL's first semester of school operations was exciting - classes started in all of the Bridge PSL public schools, students and teachers began to use their systems, and they hosted visits from a variety of stakeholders. Bridge partnered with Akon Lighting Africa and Solektra to fully wire 2 schools for solar electricity, with additional 5 solar-powered streetlights provided for the community. Field team members from three Bridge headquarters' "teams" – academics, school and community engagement, and information technology – visited schools for ongoing monitoring and support. They observed lessons and teaching, engaged community members and Parent-Teacher Associations, and worked to ensure that Bridge's systems were working and lessons taught well. In time, teachers and students reported that they were increasingly comfortable and appreciative of the longer school hours and with the Bridge curriculum.

Bridge also faced its fair share of challenges. Supporting teachers was a major challenge - nearly two-thirds of them, or 150 out of 237 – were not on payroll at the start of the school year. 20 of these teachers were existing community teachers; 130 were recent RTTI graduates. Bridge put in tremendous efforts to help get its teachers on payroll, alongside the staff of Ministry of Education, Civil Service Administration, and Ministry of Finance; nonetheless, as of February 1, 32% of Bridge PSL public school teachers remained unpaid and 19% were not yet on payroll. Progress has been made since then – as of April, 23% of Bridge PSL public school teachers remain unpaid, and 8% are not yet on payroll. Bridge PSL public school buildings and furniture needed substantial renovation as well, making it necessary for Bridge to cover unexpected costs associated with school improvements, to ensure safety for Bridge students. This included both building ceiling, wall, and door renovations; adding blackboards; and desk purchases. Getting Bridge technology working in the Liberian context was also challenging, especially given the low electricity availability in communities Bridge operates in. This was all in addition to the expected challenges of operating a new endeavor in a new country: making sure that teacher and student attendance is high; hiring a robust, talented team; traveling to schools across the country; managing finances and operations; and figuring out how to work in a new context.

4. The 2016-17 Bridge PSL Public Schools Pilot Study

The purpose of this 6v6 study is two-fold. First, we want to provide an early signal as to whether students attending Bridge PSL public schools are making greater learning gains compared to their peers attending traditional public schools. This will provide the Ministry of Education and other external parties with an indication of the program effect during the 1st year. Second, Bridge needed to get detailed information quickly about how Bridge PSL public school students are responding to the academic program, in order to adjust its lessons and other learning materials to meet students' needs and teach at appropriate levels.

Note that this study is not an impact evaluation. When designing the study, the pilot study team understood that the small sample size meant that it was likely too underpowered to detect any meaningful effects, even if they are present. In other words, with limited time and cost constraints, we understood that statistically significant results could only occur with very large gains - and while we were optimistic, we also knew how difficult it would be to make such gains in a period of only one year. Nevertheless, we still believed that the information from this study would provide an early, if noisy, indication of the direction and size of the effect of Bridge PSL public schools on student learning outcomes.

An impact evaluation of the overall PSL program, rather than Bridge alone, is being conducted separately by a team of external researchers. This larger randomized evaluation study will execute its midline assessments at the end of the 2016/17 school year and endline assessments at the end of the 2018/19 school year.[9] A preliminary policy report is expected to be released on August 20, 2017.

4.1 Sampling Strategy and Randomization

4.1.1 Sampling 6 Bridge PSL Public Schools

Bridge worked with the Ministry of Education to develop a list of 47 public school locations with conditions necessary for its operations, particularly the sufficient 2G data connection needed to support use of Bridge technology. The external evaluation team then randomly assigned Bridge which schools to operate in. The remaining schools served as controls for the larger PSL evaluation, to allow for a matched-pair design.

Initially, we expected to conduct our pilot study using the same matched-pair locations, with just a more limited scope. Our objective was to select PSL public/traditional public school pairs that were geographically representative of Bridge's presence in Liberia and had similar school-level characteristics. The random assignment of schools to Bridge by the external evaluation team presented an opportunity for this study to have a first-best set of control schools.

To ensure that each of the schools in a pair were comparable, the pair had to be in the same district. Therefore, we eliminated from consideration 2 counties in which Bridge operates schools, because they did not have any districts with at least one PSL public school and one traditional public school in the RCT. Thus, while Bridge is operating in 8 different counties, Bridge chose 6-and-6 because there were only 6 counties that could have a matched pair within the same district.

From each of the remaining 6 counties, we randomly selected one district. Within each of those districts, we selected the pair of schools in that district that had the most similar school-level characteristics (grade levels, number of classrooms, number of teachers, etc.).

However, after we shared the list of selected schools with the external evaluation team to coordinate fieldwork, concerns were raised about study contamination, test fatigue, and overexposure of their control schools to Bridge personnel. It was then agreed that the external evaluation team would independently select non-RCT comparison schools for each of the previously selected 6 Bridge PSL public schools for the purposes of Bridge's internal M&E evaluation. Thus, this study does not contaminate the external RCT study being conducted about the PSL program in total.[10]

[9] Romero, M., Sandefur, J., Sandholtz, W. (2016). PSL Evaluation FAQs. Retrieved from https://docs.google.com/document/d/1vVjmyuseF-3h3ExgZQ4Vp7IbASUQcXnfavzKZomvvbY/edit#heading=h.xxqcsz1bf8xu

[10] Once the results of the larger PSL RCT are released, we can also compare the effect on the RCT matched-pairs at endline with the effects of this DiD approach. This will then give us some idea of whether or not the control group was valid, with the obvious caveat that because both comparisons are 6 vs. 6, the confidence intervals on any treatment effects will be extremely large.

4.1.2 Matching 6 Comparison Schools

The external evaluation team determined the final matched pairs by taking the 6 previously-selected Bridge PSL public schools and conducting a principal component analysis (PCA) to evaluate which other non-RCT traditional public schools could serve as good comparison schools.[11]

Variables analyzed in the PCA included factors such as teachers per student, classrooms per student, and chairs per student. See Appendix 7 for a list of components used in their analysis. While there may be differences between a matched pair on specific characteristics, the index derived from the PCA ensures that the pair is the best match across the set of all characteristics. Because this was done in much the same way as the original RCT control schools were determined, and because the external evaluators independently completed the selection, these traditional public schools are a reasonable counterfactual for Bridge PSL public schools.

Bridge will do its best to ensure that comparison schools remain as "status quo" as possible. For example, Bridge will neither be actively attracting teachers from these schools (any vacancies will be recruited through RTTI graduates), nor actively recommending that deselected teachers from the PSL public schools be transferred to these schools (the Ministry of Education will be handling all teacher transfers). This is to prevent a strong source of selection bias from occurring in this pilot study.

4.1.3 Selection of Students within a School

During the baseline study, we randomly selected 20 students per grade level in Kindergarten through Grade 3, stratified by gender, to assess one-on-one in early grade literacy and numeracy. The on-the-spot randomization process for selecting students is detailed in Appendix 1.

When we returned to the 12 schools for midlines, our goal was to re-assess as many of the 20 students per grade from the baseline as possible. We visited each school at least 3 times, and during every visit we checked for students who may have been absent on days prior.[12,13]

We will track as many of the same students as possible through baseline, midline, and endline to allow for both the possibility of a panel and cross-sectional analysis.

4.2 The Instruments

4.2.1 Early Grade Literacy & Numeracy

To assess literacy and numeracy levels of the Kindergarten through Grade 3 students in our study, we used the Early Grade Reading Assessment and Early Grade Mathematics Assessment (EGRA/EGMA). Both EGRA and EGMA were developed by RTI International in conjunction with USAID.

EGRA is an oral pupil assessment designed to measure foundational skills for literacy in the early grades: reading letters and simple words, making letter sounds, and understanding sentences and paragraphs. EGMA is also an oral assessment, designed to measure pupils' foundational skills in numeracy and

[11] The best counterfactual schools would have been the matched traditional public schools from the randomized trial. However, it was important for this larger PSL program evaluation to minimize potential (however unlikely) contamination of the study. Therefore, the 6 "control" traditional public schools ultimately assigned to this study represent a second-best option overall, but the best option given the circumstances and request of the external evaluation team conducting the RCT.

[12] If we could not find and assess all of the original 20 students, we randomly selected students from the rest of the grade to get back to 20 assessments. However, these "replacement" students are not analyzed in this study because we do not have information on them from baseline. The purpose of conducting these assessments was two-fold. First, it allowed Bridge to understand the spread of learning levels at any given point in time. Second, it gives the pilot study team the option to conduct a cross-sectional analyses with a larger sample, should sample attrition increase.

[13] If a student was absent during all school visits, we asked school staff if the student had withdrawn. This information was noted on the student assessment lists and will be analyzed for the endline report.

mathematics in the early grades. This includes quantity discrimination, addition, subtraction, and solving word problems. Each of these foundational skills is tested with a different component of the assessment, referred to as a "subtask." Both EGRA and EGMA are administered one-on-one with students.

Bridge, Pencils of Promise, and Worldreader use EGRA/EGMA globally because it provides detailed data at the item-level that is particularly helpful in driving programmatic improvements. In addition, these assessments are open source and supported with very effective knowledge sharing forums and infrastructure provided by RTI. Bridge continues to use EGRA/EGMA as it launches in new countries like Liberia because it allows us comparison of results with Bridge's achievements in other countries as well as those generated by other organizations, since EGRA/EGMA is so commonly used.[14]

Pencils of Promise, Worldreader, and Bridge selected the specific bundle of subtasks that would be appropriate for each grade level, taking into consideration subtasks that have been conducted in Liberia on past USAID projects. The subtasks we used in the project are displayed below in Table 2, followed by the formulas for marking each subtask in Table 3.

Table 2. Subtasks Assessed

EGRA	KG	G1	G2	G3
Letter Sound Knowledge	X	X	X	
Identify Onset Sounds	X	X	X	
Non-word Reading	X	X	X	X
Familiar Word Reading	X	X	X	X
Passage Fluency		X	X	X
Reading Comprehension		X	X	X

EGMA	KG	G1	G2	G3
One-to-One Correspondence	X			
Number Identification	X	X		
Quantity Discrimination	X	X	X	
Addition Level I	X	X	X	X
Addition Level II			X	X
Subtraction Level I		X	X	X
Subtraction Level II			X	X
Word Problems		X	X	X

Table 3. Scoring Equations for Each Subtask Administered[15]

Subtask	Scoring Formula	Total # of Questions
Letter Sounds	$(\#\ Correct\ Sounds)/((60 - remaining\ seconds)/60)$	100
Onset Sounds	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	10
Non-Word Reading	$(\#\ Correct\ Words)/((60 - remaining\ seconds)/60)$	50
Familiar Word Reading	$(\#\ Correct\ Words)/((60 - remaining\ seconds)/60)$	50
Passage Fluency	$(\#\ Correct\ Words)/((60 - remaining\ seconds)/60)$	61
Reading Comprehension	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	5
One to One Correspondence	$(\#\ Correctly\ Counted\ Circles)$	100
Number Identification	$(\#\ Correctly\ Answered\ Questions)/((60 - remaining\ seconds)/60)$	20
Quantity Discrimination	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	10
Addition I	$(\#\ Correctly\ Answered\ Questions)/((60 - remaining\ seconds)/60)$	20
Addition II	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	5
Subtraction I	$(\#\ Correctly\ Answered\ Questions)/((60 - remaining\ seconds)/60)$	20
Subtraction II	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	5
Word Problems	$(\#\ Correctly\ Answered\ Questions)/(\#\ of\ Questions\ Asked)$	5

[14] Other organizations that use EGRA/EGMA include, but are not limited to: Save the Children, World Vision, FHI 360, Research Triangle Institute (RTI), and Creative Associates. See http://www.tangerinecentral.org/in-the-field-1 for more examples of projects that use this early grade reading and math measurement tool.

[15] Timed subtasks allot 60 seconds each.

4.2.2 Student Characteristics

We collected detailed background information for each student in our baseline study. We asked questions about student demographics (gender, age), education (ECE attendance, grade level), household characteristics (ownership of a cell phone, radio or television, whether the pupil had electricity), activities at home (listening to the radio, watching television, reading, doing homework, and with whom), and meals consumed within a day of the assessment (number of meals).[16]

We collected this information to allow for additional analysis by sub-groups within the sample. These observables provide clarity on any systematic differences between the groups receiving and not receiving the Bridge "treatment" that may influence results.

4.3 School Participation and Student Tracking

4.3.1 Participating Schools

A total of 12 schools are participating in our study from 6 different districts.[17] See Table 4 as follows.

Table 4. Counties and Districts of Participating Schools

Pair #	County – District
1	Bomi – Senjeh
2	Bong – Salala
3	Grand Cape Mount - Garwula
4	Margibi - Kakata
5	Montserrado - Careysburg
6	Nimba - Saclepea 2

To encourage capacity-building and to ensure data integrity, school visits were conducted by a team of local assessors hired and trained by Pencils of Promise and Bridge while accompanied by representatives from the Ministry of Education. The local District Education Officer, M&E officer, or planning officer would meet the assessors at each school and observe their work.

4.3.2 Students Assessed by Grade

658 students were assessed during both baselines and midlines. See Table 5 below for breakout by grade.

Table 5. Number of Students Assessed by Grade (EGRA/EGMA)

Grade	Bridge PSL Public Schools			Traditional Public Schools		
	Baseline	Midline	# in Both	Baseline	Midline	# in Both
KG	80	79	56	126	124	96
G1	99	98	78	118	118	97
G2	110	120	93	95	98	69
G3	117	122	93	103	94	76
TOTAL	**406**	**419**	**320**	**442**	**434**	**338**

[16] Demographic questions were included at the beginning and end of the EGRA/EGMA survey instrument. We selected these questions based on RTI's instrument, consultations with researchers, and piloting on Bridge students. The questions included could all be reasonably and accurately answered by young students.

[17] School names are not presented in this paper to order to minimize behavioral change targeted only to these specific schools, which may undermine the generalizability of the study.

Recall that during baselines, we randomly selected 20 students per grade level to assess. This means that if there were more than 20 pupils in a classroom, random sampling occurred. If there were less than 20 students in a classroom during the time of baseline assessments, all students in that classroom were assessed.[18]

As such, the counts in table 5 are not enrollment figures (see Section 5.1 for self-reported enrollment counts), nor will there always be a total of 240 students assessed in each classroom (12 schools multiplied by the 20 student assessment target).

In addition, two of the Bridge PSL public schools selected did not offer Kindergarten and one Bridge PSL public school did not offer 1st grade at the time of baseline assessments. This resulted in more assessments being completed at comparison schools than Bridge PSL public schools.

The average sample attrition rate was 22.4% between baselines and midlines. See Table 6 below for details by grade.

Table 6. Attrition by Grade Level

Grade	Bridge PSL Public Schools	Traditional Public Schools
KG	30%	24%
G1	21%	18%
G2	15%	27%
G3	21%	26%
TOTAL	**21%**	**24%**

Note that sample attrition is not the same as attrition from schools (or withdrawal of enrollment). As of the date of this report, preliminary analysis shows ~6% of sample attrition is due to students no longer being at the baseline school, and ~16% due to students being absent at time of assessment. Given that the majority of assessments at Bridge PSL public schools was conducted in the afternoon during the extended day periods, there is a possible bias toward absenteeism at Bridge PSL public schools.[19] The overall average sample attrition rate was slightly lower for Bridge than comparison schools, although this difference is not statistically significant. [20] As sample attrition can greatly impact results, we test for differential attrition in Section 8.

4.4 The Field Team

To complete our baseline and midline assessments, a team of M&E field officers was assembled. Bridge, in collaboration with Pencils of Promise, hired assessors, trained the assessors on the instruments, coordinated fieldwork, and provided oversight of field teams.[21] To streamline the data collection process

[18] There were fewer than 20 pupils present during baselines in some classrooms both at Bridge PSL public schools and traditional public schools. Specifically, 4 Bridge PSL public school classrooms and 13 traditional public school classrooms had fewer than 20 pupils present during baseline assessments.

[19] Given the longer school day at Bridge PSL public schools, it was possible to visit a traditional public school in the morning and its matched Bridge PSL public school in the afternoon. Therefore, to reduce fieldwork costs and leverage the fact that an assessor team was already in an area, once the traditional public school adjourned for the day, the same team would visit the matched Bridge PSL public school. It is possible that having unmatched time of visits for assessments between the public schools in treatment and control contributed to differential absenteeism or possible differential assessment results, biased against Bridge PSL public schools. Please see Section 8.2.

[20] For the endline report, we aim to provide additional statistics regarding each student assessed at baseline. This will help clarify sample attrition issues, and understand whether a given child was simply absent on the day of assessments or has withdrawn from school – and if the latter, what the reason was (move, drop-out, etc.)

[21] This included confirming that schools were visited and that students were assessed. It also included ensuring that the data were saved and uploaded on a daily basis.

of EGRA/EGMA results, assessors were provided with tablets and used the Tangerine[22] platform to conduct surveys and assess students.

4.4.1 Recruiting and Hiring

Pencils of Promise and Bridge received over 180 applications for 12 temporary M&E field officer positions for baselines. After initial resume reviews, members of each organization's M&E global team completed phone screens with 50 candidates and then narrowed the group down to 32 for in-person interviews and exercises. To choose final team members, reference checks were conducted on the top 18 applicants.

Nine field officers returned to assist with our midline evaluation. A similar process was followed to hire three new officers to maintain a team of 12.

4.4.2 Training

The original 12 candidates were invited to participate in a six-day intensive baseline training.[23] The team learned how to administer the EGRA/EGMA and experimental assessments using both tablets and hard-copies. All 12 candidates passed training, with each candidate scoring 92% or better on the final test.

Our three new officers went through a similar three-day intensive midline training, and all 12 officers were invited to a two-day review session of key skills.

4.4.3 Monitoring

Pencils of Promise and Bridge established processes to ensure data integrity by monitoring each field teams' daily progress. These efforts were enabled by electronic data collection. Field teams uploaded completed assessments daily so that the pilot study team could react to the data in real time and communicate with the field teams to address issues quickly. For more details, see Appendix 3.

Again, the pilot study team coordinated all fieldwork with the Ministry of Education, whose representatives were present at both Bridge PSL public school and comparison school visits.

5. Summary Statistics

5.1 Baseline Student Characteristics

5.1.1 Demographics

The differences between Bridge PSL public school students and traditional public school students are small and limited. The two demographic characteristics that differ most between the groups are age (Bridge PSL public school students are about 1 year younger), and as such, years of ECE (since if the child is younger, they would have also had less years of ECE eligibility). Both differences are likely a product of Bridge's "treatment"; placing students in age-appropriate grade levels and a specific plan to ensure children of ECE age are enrolled in ECE grades, and "overage" children previously assigned to ECE grades are placed in to Primary early grades. There is also a small difference in the likelihood that a student ate dinner the night before the assessment (Bridge PSL public school students are slightly less likely to have eaten). Otherwise,

[22] Developed by RTI, Tangerine is a software application that allows the programming of tailored EGRA/EGMA instruments online, which then can be downloaded onto tablets and used to collect field data in real time. http://www.tangerinecentral.org/

[23] Length of training is generally 5 days for EGRA/EGMA, but may vary depending on the number of subtasks and additional survey questions. Research Triangle Institute (RTI) conducts generally a 5 day training, including field practicum days. In Kenya, Decisions Management Consulting also conducts 5-day EGRA/EGMA trainings with field practicum.

gender, language, homework support, home activities, and assets are comparable between Bridge PSL public school and traditional public school students.[24]

For more details and tables on baseline characteristics, see Appendix 4.

- **Age:** Students at Bridge PSL public schools are generally one year younger than students attending traditional public schools. This difference is statistically significant for half of the grades surveyed.

- **Gender:** There is a similar proportion of female students at both school types across all grade levels surveyed.

- **Early Childhood Education (ECE):** Students at Bridge PSL public schools in Kindergarten, 1st grade, and 3rd grade had less years of ECE prior to the current academic year. This is of course correlated with age.[25]

- **Meals:** Students across both school types consumed an average of 2 meals within a 24-hour period of the EGRA/EGMA assessment. Bridge PSL public school students (in 1st and 3rd grade) were less likely to have had dinner compared to traditional public school students.[26]

- **Language:** Bridge PSL public school and traditional public school students were equally likely to speak English at home.

- **Reading & Homework:** Traditional public school students in 2nd grade are more likely to receive support completing homework.

- **Other Home Activities:** Bridge PSL public school students in 3rd grade are slightly less likely to listen to the radio, and in Kindergarten, less likely to watch television with parents.

- **Assets and Electricity:** A similar proportion of Bridge PSL public school students own televisions, radios, and have electricity as traditional public school students. There does not seem to be a difference in "wealth" between the student groups.

The results of these comparisons ring true for the full sample of students assessed at baselines, apart from reading and other home activities. In the full sample, Bridge PSL public school Kindergarten students were less likely to read out loud to parents and 1st graders were less likely to be read to. Students in both groups were equally likely to watch television with their parents.

5.1.2 Baseline EGRA Results

At baseline, Bridge PSL public school students and those at comparison traditional public schools have similar reading levels. The only statistically significant difference was found in 2nd grade passage fluency. Bridge PSL public school 2nd grade students were able to read 2.8 more words at baseline on average.[27]

This difference is consistent for the full sample of students at baseline and the restricted sample (students who were assessed in both the baseline and midline).

See Appendix 5 for detailed EGRA summary statistics at baseline.

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[24] We also believe it will be important to examine the percent of students who are new to each school this year (vs. who had attended the same school the year before). We are working on incorporating this information into our next report.
[25] We will be formally testing this by examining the probability of attending ECE, given age and enrollment at a Bridge PSL public school (treatment), to be included in the endline report.
[26] While there was a difference for having had dinner the night before, there was no difference for having eaten breakfast the morning of the assessment.
[27] Given the number of outcomes we are examining, we will also later adjust these comparisons for multiple hypothesis testing for the endline report.

5.1.3 Baseline EGMA Results

Students were less comparable at baselines on early grade math, particularly in Kindergarten. Statistically significant differences were found in Kindergarten on Number Identification, Quantity Discrimination, and Addition 1. The same is true for Subtraction 1 in 1st grade.

Bridge PSL public school Kindergarten students, at the beginning of the year, identified 15.9% fewer numbers than their peers at traditional public schools. They answered 9.9% fewer quantity discrimination questions and solved 1.9 fewer addition problems in a minute at baseline. 1st graders solved 1.1 fewer addition and subtraction problems in a minute.

These differences are generally consistent for the full sample of students at baseline and the restricted sample (students who were assessed in both the baseline and midline) except for 2nd grade – which was actually more unbalanced in the full sample.

See Appendix 5 for detailed EGMA summary statistics at baseline.

5.2 School Characteristics

During midlines, assessors completed in-person surveys at each school – one principal interview and one observational.[28] The goal of these surveys was to allow us to understand some of the differences and similarities between the schools in our study.

Recall that the team of external evaluators assigned us these comparison schools by applying the Principal Component Analysis technique to EMIS data. While each comparison school may look different than its corresponding Bridge PSL public school on any given observable characteristic, the idea is that it is the best comparison school balancing *across* characteristics. We also found that EMIS data could sometimes be outdated, which is why we thought that conducting a survey on site was an important addition to our student assessments. It is important to keep in mind however, that these surveys were completed on a single day for each school, and as a result, some of this information may not be representative of the school over the course of the year.

Tables 7 – 9 below summarize characteristics across the Bridge PSL public schools as well as the comparison group of traditional public schools during midlines in January 2017.

[28] Unfortunately, we do not have this information from baselines.

Table 7. School Characteristics from In-Person Visits

	Bridge PSL Public Schools	Traditional Public Schools
DATA FROM OBSERVATIONS		
Accessibility		
Minutes Walk from Main Road	**4.2**	**26.0**
Accessible by Foot During Heavy Rain	**100%**	**100%**
Accessible by Motorbike and Car	**100%**	**83%**
Infrastructure & Assets		
Has Electricity	**0%**	**0%**
Number of Classrooms	**7.3**	**9.7**
Number of Classrooms in Active Use[29]	**7.3**	**9.7**
Number of Bathrooms	**6.7**	**7.0**
Number of Bathrooms in Active Use	**3.5**	**5.5**
Has a Library	**33%**	**50%**
Has Access to Water	**100%**	**100%**
DATA SELF-REPORTED BY PRINCIPALS		
School Staff Details		
Principal Gender	**5 of 6 M**	**5 of 6 M**
Years of Experience as Principal	**1.6**	**16.6**
Teacher Gender	**34 of 44 M**	**30 of 46 M**
# of Teachers (Primary & ECE Only)[30]	**7.3**	**7.6**
# of Grade Levels Offered (All Grades)	**7.3**	**12.3**
# of Grade Levels Offered (Primary & ECE Only)[31]	**7.3**	**8.8**
Additional Features		
Average enrollment	**45.5**	**32.7**
Length of School Day (Hours)[32]	**7.9**	**5.3**
Has Free Lunch Program	**33%**	**50%**
Had a PTA Meeting in 1st Semester	**83%**	**83%**

[29] Surveyor counts all classrooms that are accessible to students during the survey. This count includes ECE, primary, junior high, and high school classrooms if the school offers those grade levels. For endlines, the survey will be updated to get a mapping of each classroom and the grade level it serves.

[30] Bridge PSL public schools have a 1-to-1 ratio of teachers to classrooms and grades offered. As a result, Bridge PSL public schools in the study have 1.5 ECE teachers and 5.8 primary teachers on average, which perfectly correlates with the number of grades offered (due to available classrooms). Traditional public schools in the study have on average 0.86 teachers for each grade offered (teachers cover multiple classrooms); as such, they have 2.3 ECE teachers and 5.3 primary teachers on average, but 2.8 ECE grades and 6 primary grades on average.

[31] In the study, one Bridge PSL public school doesn't offer 1st grade or ECE grade levels and three Bridge PSL public schools do not offer Beginner or Nursery classes due to limited numbers of classrooms. All traditional public schools in the study offer all 6 primary grades, Kindergarten, and Nursery class. One traditional public school does not offer Beginner class.

[32] Most Bridge PSL public school principals said their day runs from 7:30 am to 3:30 pm. Specifically, 5 out of 6 stated this as their official school hours. One outlier said 7:40 am to 3:15 pm. Official Bridge PSL public school hours for students are 8:00 am to 3:15 pm. Traditional public school principals all had varying answers for the length of their school day, with start times ranging from 7:35 am to 8:30 am and ending times ranging from 12:30 pm to 1:45 pm. Official hours at traditional public schools are generally from 8:00 am to 1:00 pm.

Table 8. Grade Levels Offered & Teacher or Substitute Presence[33]

	Bridge PSL Public Schools		Traditional Public Schools	
	% of Schools Offering Class	Teacher or Substitute Present	% of Schools Offering Class	Teacher or Substitute Present
Beginner Class	33%	100%	83%	100%
Nursery Class	33%	100%	67%	50%
Kindergarten	83%	100%	100%	83%
1st Grade	83%	100%	100%	50%
2nd Grade	100%	83%	100%	50%
3rd Grade	100%	83%	100%	50%
4th Grade	100%	83%	100%	50%
5th Grade	100%	83%	100%	50%
6th Grade	100%	67%	100%	33%
Average	**81%**	**89%**	**94%**	**57%**

Table 9. Average Student Enrollment & Attendance[34]

	Bridge PSL Public Schools			Traditional Public Schools		
	# of Students Enrolled	# of Students Present	% of Students Present	# of Students Enrolled	# of Students Present	% of Students Present
Beginner Class	57.0	30.0	53%	72.8	47.2	65%
Nursery Class	43.0	27.0	63%	24.5	16.8	69%
Kindergarten	52.8	37.4	71%	27.7	21.8	79%
1st Grade	58.2	39.4	68%	38.8	29.8	77%
2nd Grade	46.7	28.3	61%	30.0	20.3	68%
3rd Grade	45.5	28.8	63%	28.2	20.5	73%
4th Grade	35.8	20.5	57%	29.5	22.2	75%
5th Grade	30.7	15.8	51%	19.2	14.3	74%
6th Grade	39.5	18.5	47%	23.2	13.3	57%
Average	**45.5**	**27.3**	**60%**	**32.7**	**22.9**	**70%**

The characteristics that differ the most are the length of the school day, principals' years of experience, the number of classrooms, the attendance of teachers, and the pupil to teacher ratio (PTR), and student attendance:

[33] At the 6 Bridge PSL public schools, reported attendance averaged 100% in September. However, due to outstanding issues with Ministry payroll, some of the Bridge PSL public school teachers are not getting paid. As a result, these (and other) Bridge PSL public schools have seen a declining trend in attendance; the reported attendance averaged 82% in February. While many teachers continue to show up and teach without pay - a testament to their dedication to serving students - others are unable to continue, understandably, as they have to find other means of supporting their families.

[34] Enrollment figures are self-reported as counts per grade by the principal via an interview with a surveyor. We did not verify the enrollment counts with a copy of the official student roster, but are looking into doing this for endlines. Attendance for each class was counted by the surveyor upon visiting each classroom.

Observed Characteristics by Pilot Study Field Team

- **Accessibility:** All schools in the study are accessible by foot or motorbike, even during heavy rain. Most schools are a short walk from the main road and accessible by car, the only exception is the traditional school in Bomi county.

- **Electricity & Water:** None of the schools in the study have electricity. All schools in the study have access to water.

- **Number of Classrooms:** Bridge PSL public schools typically have 2 less classrooms than traditional public schools. Essentially all classrooms at both school types are in active use.

- **Number of Bathrooms:** Bridge PSL public schools and traditional public schools both generally have 7 bathrooms on campus, but the number in active use differs. Traditional public schools typically have 5.5 bathrooms open, while Bridge PSL public schools have 3.5.

- **Has a Library:** Two Bridge PSL public schools and three traditional public schools in our study have libraries.

- **Teacher Attendance:** 88% of teachers were present at Bridge PSL public schools compared to 58% at traditional public schools during school visits.

- **Student Attendance:** On average, there were 27.3 students present during the attendance check at Bridge PSL public schools compared to 22.9 at traditional public schools. Combined with principal-reported enrollment figures in January (see below), this means that 60% of students were present at Bridge PSL public schools compared to 70% at traditional public schools during school visits.[35]

Principal-Reported Characteristics through Interview by Pilot Study Field Team

- **Student Enrollment:** The average class size at Bridge PSL public schools is 45.5 students vs. 32.7 students at traditional public schools. With the exception of beginner class, there were higher levels of enrollment at Bridge PSL public schools than traditional public schools.

- **Number of ECE Grade Levels Offered:** All traditional schools in the study offer Beginner, Nursery, and Kindergarten class, with the exception of the school in Margibi County (which does not offer Beginner). Two Bridge PSL public schools offer all 3 ECE grades, three offer Kindergarten only, and one doesn't offer any ECE classes. This is due to physical infrastructure constraints; there are not enough classrooms in some of the Bridge PSL public schools to offer 3 years of ECE and 6 years of Primary.

- **Number of Primary Grade Levels Offered:** All schools in the study offer 1st through 6th grade, with the exception of the Bridge PSL public school in Margibi (which doesn't offer 1st grade due to physical classroom constraints; not offering 1st grade was the decision made jointly by PTA, DEO, MOE and Bridge PSL management).[36]

[35] Feeding programs are not offered at all public schools, but they appear to be more critical for PSL public schools due to the longer school day which includes lessons after the typical lunch time. Anecdotally, the longer school day at Bridge PSL public schools has made it more difficult for some students to attend school for the full day. Unfortunately, to save costs for M&E administration, Bridge PSL public schools were more likely to be assessed after the lunch hour, and traditional public schools before the end of their teaching day, before the lunch hour. This leads to a possible bias against Bridge PSL public schools due to some students in the treatment being absent after the lunch hour.

[36] The community wanted to build a new annex room. This is currently in progress.

- **Principal Gender:** Bridge PSL public schools and traditional public schools have the same number of male and female principals.

- **Principals' Years of Experience:** Bridge PSL public school principals have less experience than their peers at traditional public schools. The Bridge PSL program often brought in new principals from the MOE-approved pool of recent RTTI graduates to its schools. This resulted in the average years of experience for Bridge principals being 1.5 years vs. 16.6 years for traditional public school principals.

- **Number of Teachers:** Bridge PSL public schools generally have 2 less teachers than traditional schools. This is directly related to the number of classrooms each school has.

- **Percent of Female Teachers:** Traditional public schools have more female teachers (42% or 16 out of 46) than Bridge PSL public schools (23% or 10 out of 44).[37]

- **Length of School Day:** Most Bridge PSL public school principals report a school day beginning at 7:30 am and lasting until 3:30 pm; official hours are 8 am to 3:15 pm for students. Traditional public school principals generally report the school day beginning at 7:30 am and lasting until 1 pm; official hours are broadly 8 am to 1 pm for students. On average Bridge PSL public schools are open 2.6 additional hours per day per principal reports.

- **Free Lunch Program:** Two Bridge PSL public schools and three traditional public schools in our study offer free lunch supported by separate NGOs.

- **PTA Meetings:** Most schools had at least one PTA meeting in the first semester.

For more details and tables on characteristics by school, see Appendix 6.

6. Improvements in Academic Achievement

6.1 Methodology

6.1.1 Concept of Difference-in-Differences

The difference-in-differences (DiD) model allows us to estimate the "Bridge PSL effect" – the change in student academic performance as a direct result of attending a PSL public school operated by Bridge – without requiring a randomized experiment.[38]

DiD isolates treatment effects by comparing the difference in outcome measures at two points in time for the treatment (Bridge PSL public schools) and control (traditional public schools) groups. In its simplest form, the average Bridge PSL treatment effect is calculated as:

[37] This school staffing gender imbalance at Bridge PSL public schools reflects an inherited gender bias towards male school staff at the schools prior to Bridge management and also an inherent gender bias in the qualified pool of teachers Bridge was allowed to select from for additional school staff. At the Bridge PSL public schools in this study, there were originally 24.5% of women teachers on staff (49 men, 16 women). After the approved MOE teacher selection process, Bridge requested the transfer out 36 men and 11 women. Bridge requested the placement of 27 men and 8 women from the government-approved RTTI training pool, resulting in the final pool of teachers with 24.5% women on staff – equal to the ratio of female staff members before Bridge engaged in management.

[38] Again, note that when we say "Bridge PSL effect", it is not intended to imply that this is an impact evaluation. In addition, we may also be able to employ a matching technique on top of DiD in future iterations of this paper.

$$\textit{Bridge PSL Treatment Effect} = (\textit{Midlines}_{\textit{Bridge}} - \textit{Baselines}_{\textit{Bridge}}) - (\textit{Midlines}_{\textit{Traditional}} - \textit{Baselines}_{\textit{Traditional}})$$

DiD essentially ensures that any unobserved variables that remain constant over time and that are associated with the outcome will not bias our estimation of the treatment effect. However, it is important to note a few assumptions we are making to employ this methodology. First, the model assumes that the unobserved constant variables would affect both the treatment and control groups equally. Second, it also assumes that there are no unobserved time-varying variables that differentially affect treatment and control schools.[39] In other words, it assumes that if the treatment group had not received the treatment at all, its change from baseline would be the same as the outcome for the control group.[40]

6.1.2 Application of Model

We can estimate treatment effects using a DiD model via either a simple difference of within-group differences or a regression framework. As compared to calculating the simple difference in within-group differences, a regression framework provides us with the added benefit of including extra explanatory (control) variables in our model.[41]

Because we assessed the same students at midlines as at baselines, we can incorporate information from two time periods for the exact same individuals. This will make our analysis more statistically powerful than the simplest application of DiD, by taking into account additional variables that we suspect may have an impact on the treatment effect.[42] It also allows us to factor in the possibility of differential trends depending on the students' characteristics at baseline. For example, it helps us understand whether students who start with lower baseline scores achieve an additional increase in performance at follow-up when compared to students as a whole.

Specifically, we take into account the following information:

- **Grade Levels:** The child's grade level, to allow for differing levels of achievement across grades;
- **Baseline Assessment Scores:** The student's score at baseline on a particular subtask, along with its squared and cubed functions to allow for the possibility of non-linear effects;
- **Demographics:** Age and gender;
- **Educational History:** Whether the child attended school last year and years of ECE attended (if any);
- **Meals:** Number of meals the child had in the past day; and
- **Home Life Indicators:** Whether the child has electricity at home, whether the child reads out loud at home, and whether the child speaks English at home.
- **Assets:** Whether the child has a cellphone, TV, and radio at home.
- **School Activities with Parents:** Whether the child does homework and reads aloud with parents at home.
- **Other Activities with Parents:** Whether the child watches TV and listens to the radio with parents.

[39] For instance, our model cannot control for circumstances such as neighborhoods with treatment schools gaining access to electricity more quickly than neighborhoods with control schools, which could potentially bias our results. However, because of our set of baseline, midline and endline demographic variables, we will be able to test whether observed characteristics differentially change in treatment and control neighborhoods, which should provide some indication about the size of any potential bias.

[40] Buckley, Jack & Yi Shang (2003). "Estimating policy and program effects with observational data: the 'differences-indifferences' estimator." Practical Assessment, Research & Evaluation, 8(24). Retrieved from http://PAREonline.net/getvn.asp?v=8&n=24.

[41] Without control variables added into the framework, the estimation of treatment effects using either method is the same.

[42] Buckley, J. & Shang, Y. (2003)

This translates into the following model specification for our regression analysis:

$$\textit{midline subtask score} = \beta_0 + \beta_1(\textit{treatment}) + \beta_2(\textit{grade 1}) + \beta_3(\textit{grade 2}) + \beta_4(\textit{grade 3}) + \beta_5(\textit{baseline subtask score}) + \beta_6(\textit{baseline subtask score}^2) + \beta_7(\textit{baseline subtask score}^3) + \beta_8(\textit{age}) + \beta_9(\textit{female}) + \beta_{10}(\textit{attended school last year}) + \beta_{11}(\textit{has electricity}) + \beta_{12}(\#\textit{ of years of ECE}) + \beta_{13}(\#\textit{ of meals}) + \beta_{14}(\textit{reads to someone at home}) + \beta_{15}(\textit{asset index}) + \beta_{16}(\textit{school activities with parents index}) + \beta_{17}(\textit{other activities with parents index}) + \beta_{18}(\textit{speaks English at home}) + \varepsilon$$

Once we incorporate these factors, we can better isolate the effect of attending a Bridge PSL public school from other things that may affect midline assessment scores. The indicator for attending a Bridge PSL public school can therefore be interpreted as the marginal effect of attending a Bridge PSL public school on academic gains, holding each student's baseline score and other characteristics constant.[43]

Note that this type of model naturally excludes pupils who attrited from our sample as well as those who had not been assessed previously. Therefore, the overall number of students included in the analysis is smaller than the number of students assessed during baselines, a concern we examine in Section 8.

6.2 Results

6.2.1. Early Grade Reading

We analyzed the output generated from our panel DiD model in order to compare Bridge PSL public school and traditional school differences. For five literacy subtasks, the overall "Bridge effect" across grades is positive, large, and statistically significant.

Among EGRA subtasks, the most notable effects are in letter sounds, familiar word reading and passage fluency. Not only are Bridge's incremental gains statistically significant, they represent a large amount of learning. On average, students at Bridge PSL public schools pronounced an additional 12.3 letter sounds, read an additional 3.5 familiar words per minute, and read an additional 7 story words per minute beyond their peers at traditional public schools, when controlling for baseline ability and other student characteristics.

Why is reading fluency, or the ability to read text accurately and more quickly, so important? Fluency is a critical precursor to comprehension. As students become fluent readers, they begin to recognize words automatically. Once they are able to group words together more quickly, they can gain meaning from the group of words they just read. In short, fluency means kids are concentrating on meaning instead of stumbling to decode.[44]

There are few clear trends on how student-level characteristics contribute to midline assessment scores. The inclusion of baseline test scores likely absorbs much of the information these additional observables provide. Additional years of early childhood education are associated with higher scores for passage fluency. Older students in the study perform worse on passage fluency and reading comprehension. See Table 10 below for additional details.

[43] We use STATA's -reg- command to run our model, clustering at the school & class level and reporting robust standard errors.
[44] Fuchs, L. S., Fuchs, D., Hosp, M. K., & Jenkins, J. R. (2001). Oral reading fluency as an indicator of reading competence: A theoretical, empirical, and historical analysis. Scientific Studies of Reading, 5(3), pp. 239–256.

Table 10. EGRA Results (Raw Scores)

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	12.27**	0.0300	0.817**	3.472**	6.990**	0.0604**
	(2.098)	(0.0355)	(0.247)	(0.828)	(1.453)	(0.0167)
Student in Grade 1	-0.971	-0.0187	0.493	0.906		
	(1.793)	(0.0485)	(0.325)	(0.946)		
Student in Grade 2	-0.572	0.0813+	1.276**	2.093+	2.399+	0.0603**
	(2.436)	(0.0464)	(0.270)	(1.235)	(1.298)	(0.0175)
Student in Grade 3			0.695+	1.593	2.341	0.0902**
			(0.404)	(0.961)	(1.760)	(0.0235)
Baseline Task Score	1.614**	-0.227	2.287*	1.385**	1.770**	-0.254
	(0.466)	(0.348)	(1.070)	(0.219)	(0.296)	(0.439)
Baseline Task Score ^2	-0.0201	1.259	-0.201	-0.00540	-0.00547	4.728*
	(0.0316)	(1.375)	(0.329)	(0.0138)	(0.0173)	(2.196)
Baseline Task Score ^3	0.000169	-0.975	0.00731	-0.0000120	-0.0000407	-3.905+
	(0.000477)	(1.316)	(0.0211)	(0.000207)	(0.000278)	(2.171)
Age	0.469+	0.00250	-0.0426	-0.0550	-0.577*	-0.00765*
	(0.271)	(0.00392)	(0.0416)	(0.125)	(0.232)	(0.00328)
Female	-1.009	-0.00724	-0.777**	-0.522	-0.740	-0.0325**
	(0.814)	(0.0260)	(0.218)	(0.621)	(0.882)	(0.0119)
Attended School Last Year	-0.809	-0.0172	0.577**	0.758	1.530	0.00168
	(1.679)	(0.0376)	(0.206)	(1.016)	(1.763)	(0.0235)
Has Electricity	-0.690	0.0176	-0.641**	-0.174	-1.758	-0.0326+
	(1.104)	(0.0298)	(0.236)	(0.601)	(1.200)	(0.0180)
Years of ECE	1.365+	0.00578	0.0124	0.226	2.197*	0.0121
	(0.734)	(0.0172)	(0.135)	(0.416)	(0.922)	(0.00975)
Meal Count	0.218	0.0117	0.00101	-0.293	-0.358	-0.00274
	(0.622)	(0.0128)	(0.102)	(0.355)	(0.634)	(0.00888)
Reads Aloud at Home	1.237	0.0401	0.123	0.567	1.864*	0.0133
	(1.099)	(0.0266)	(0.176)	(0.637)	(0.841)	(0.00998)
Asset Index	-1.087	0.0203	0.131	0.745	1.381	0.00533
	(2.300)	(0.0445)	(0.402)	(1.346)	(2.183)	(0.0311)
School Activity with Parent Index	2.081	-0.0384	0.386	-0.229	-0.584	0.0253
	(1.530)	(0.0361)	(0.478)	(0.870)	(1.438)	(0.0178)
Other Activity with Parent Index	0.936	-0.0530	-0.0711	-0.656	0.209	-0.00324
	(1.379)	(0.0373)	(0.314)	(1.036)	(2.315)	(0.0310)
Speaks English at Home	-1.694	0.0239	-0.0206	0.946	0.278	0.0141
	(1.395)	(0.0220)	(0.254)	(0.678)	(1.091)	(0.0163)
Constant	-4.605	0.216**	0.0617	0.233	-1.626	0.0482
	(3.235)	(0.0553)	(0.665)	(2.298)	(4.763)	(0.0582)
Count	461	461	626	626	490	490
R-squared	0.514	0.110	0.321	0.664	0.635	0.321

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

We also ran our panel DiD model on standardized scores, in order to interpret results in terms of effect sizes. This allows for easier comparison to other educational interventions. Details of how we standardized the scores can be found in Appendix 8.

Among EGRA subtasks, effect sizes were very large. The letter sound subtask had the largest effect size at 1.90 standard deviations. This is followed by non-word reading at 0.68 standard deviations, reading comprehension at 0.71 standard deviations, passage fluency at 0.81 standard deviations, and familiar word reading at 0.51 standard deviations. These large effect sizes were driven in part by the large amount of zero scores at baseline, which resulted in a narrower distribution of scores.

As a robustness check, we also ran two additional specifications (one more parsimonious without student characteristics, and one with additional interaction terms) to compare Bridge PSL public school and traditional school differences. The results for EGRA are consistent between models. These additional specifications and their results can be found in Appendix 10.

See Table 11 below for the detailed standardized results.

Table 11. EGRA Results (Standardized Scores)

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	1.903**	0.133	0.684**	0.509**	0.809**	0.711**
	(0.325)	(0.157)	(0.207)	(0.121)	(0.168)	(0.197)
Student in Grade 1	-0.151	-0.0827	0.413	0.133		
	(0.278)	(0.215)	(0.272)	(0.139)		
Student in Grade 2	-0.0887	0.360+	1.070**	0.307+	0.278+	0.710**
	(0.378)	(0.206)	(0.226)	(0.181)	(0.150)	(0.206)
Student in Grade 3			0.583+	0.234	0.271	1.061**
			(0.338)	(0.141)	(0.204)	(0.277)
Baseline Task Score	1.541**	0.201+	2.182*	1.334**	1.708**	-0.00560
	(0.370)	(0.113)	(0.916)	(0.126)	(0.181)	(0.333)
Baseline Task Score ^2	-0.124	0.131	-0.233	-0.0379	-0.0528	0.375*
	(0.187)	(0.110)	(0.373)	(0.0759)	(0.113)	(0.172)
Baseline Task Score ^3	0.00702	-0.0497	0.0104	-0.000558	-0.00304	-0.0282+
	(0.0199)	(0.0670)	(0.0301)	(0.00962)	(0.0207)	(0.0157)
Age	0.0727+	0.0111	-0.0357	-0.00806	-0.0668*	-0.0901*
	(0.0420)	(0.0174)	(0.0349)	(0.0183)	(0.0269)	(0.0386)
Female	-0.156	-0.0321	-0.651**	-0.0765	-0.0857	-0.383**
	(0.126)	(0.115)	(0.183)	(0.0910)	(0.102)	(0.140)
Attended School Last Year	-0.125	-0.0761	0.483**	0.111	0.177	0.0198
	(0.260)	(0.167)	(0.172)	(0.149)	(0.204)	(0.277)
Has Electricity	-0.107	0.0778	-0.537**	-0.0255	-0.203	-0.384+
	(0.171)	(0.132)	(0.198)	(0.0882)	(0.139)	(0.211)
Years of ECE	0.212+	0.0256	0.0104	0.0331	0.254*	0.143
	(0.114)	(0.0762)	(0.113)	(0.0610)	(0.107)	(0.115)
Meal Count	0.0337	0.0518	0.000847	-0.0430	-0.0414	-0.0323
	(0.0965)	(0.0568)	(0.0856)	(0.0520)	(0.0734)	(0.105)
Reads Aloud at Home	0.192	0.177	0.103	0.0832	0.216*	0.156
	(0.170)	(0.118)	(0.148)	(0.0933)	(0.0973)	(0.117)
Asset Index	-0.168	0.0900	0.110	0.109	0.160	0.0627
	(0.357)	(0.197)	(0.337)	(0.197)	(0.253)	(0.366)
School Activity with Parent Index	0.323	-0.170	0.324	-0.0336	-0.0676	0.298
	(0.237)	(0.160)	(0.400)	(0.128)	(0.166)	(0.210)
Other Activity with Parent Index	0.145	-0.235	-0.0596	-0.0962	0.0242	-0.0381
	(0.214)	(0.165)	(0.263)	(0.152)	(0.268)	(0.365)
Speaks English at Home	-0.263	0.106	-0.0173	0.139	0.0321	0.166
	(0.216)	(0.0975)	(0.213)	(0.0994)	(0.126)	(0.192)
Constant	-0.547	-0.0586	0.327	0.277	0.267	0.205
	(0.492)	(0.272)	(0.608)	(0.370)	(0.608)	(0.673)
Count	461	461	626	626	490	490
R-squared	0.514	0.110	0.321	0.664	0.635	0.321

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

6.2.2. Early Grade Math

For three numeracy subtasks, the overall "Bridge effect" across grades is positive, large, and statistically significant.

Bridge's incremental gains on these subtasks are meaningful. On average, students at Bridge PSL public schools answered 2.6 more addition 1 questions and 2.2 more subtraction 1 questions per minute than their peers at traditional public schools, when controlling for baseline ability and other student characteristics. They also learned to solve 9% more advanced addition problems (addition 2).

Fluency in mathematics, like in reading, is also important. In order to be successful in more advanced math topics, you must be able to do basic calculations fluently. Substantial growth in fluency means that students are using more efficient strategies to solve problems, which is key to success in upper grades.[45]

Student-level characteristics contribute to midline scores differently for numeracy than literacy. Again, the inclusion of baseline test scores likely absorbs much of the information these additional observables provide. Additional years of early childhood education are associated with higher scores for number identification. Girls overall performed worse on quantity discrimination, addition, subtraction, and word problems. This is a finding that Bridge PSL public schools will be looking into over the second semester, with the goal of gender equity in learning gains by endlines. Older students in the study perform better on quantity discrimination and addition 1. Students who do school related activities at home with their parents and students who eat more meals perform better on subtraction 2. Students who read aloud at home perform better on addition 2. See Table 12 below for additional details.

[45] Russell, Susan Jo. (May, 2000). Developing Computational Fluency with Whole Numbers in the Elementary Grades; Hiebert, J. (1999). Relationships between research and the NCTM Standards. Journal for Research in Mathematics Education, 30 (1), 3-19.

Table 12. EGMA Results (Raw Scores)

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	-6.367	2.145+	0.0268	2.567**	0.0934*	2.208**	0.0915+	0.0510+
	(5.750)	(1.136)	(0.0242)	(0.369)	(0.0375)	(0.337)	(0.0475)	(0.0259)
Student in Grade 1		-0.195	-0.00862	0.301				
		(0.861)	(0.0335)	(0.569)				
Student in Grade 2			0.0775*	1.266*		0.931*		0.0928**
			(0.0359)	(0.586)		(0.441)		(0.0319)
Student in Grade 3				1.793**	0.0682+	1.435**	-0.00165	0.0783**
				(0.569)	(0.0385)	(0.424)	(0.0477)	(0.0286)
Baseline Task Score	0.329	1.058**	1.467**	0.705**	0.542	0.972**	1.648**	0.234
	(1.196)	(0.0948)	(0.265)	(0.207)	(0.385)	(0.227)	(0.298)	(0.265)
Baseline Task Score ^2	0.00345	-0.00904**	-1.132+	0.00601	-0.446	-0.0364	-3.843**	0.612
	(0.0254)	(0.00124)	(0.635)	(0.0214)	(0.872)	(0.0271)	(0.761)	(0.636)
Baseline Task Score ^3	-0.0000400	0.0000197**	0.392	-0.000634	0.188	0.000355	2.605**	-0.477
	(0.000159)	(0.00000462)	(0.414)	(0.000424)	(0.577)	(0.000509)	(0.601)	(0.428)
Age	1.507	-0.0154	0.00881*	0.272**	-0.0178+	0.0586	-0.00675	0.00202
	(0.986)	(0.177)	(0.00393)	(0.0602)	(0.00968)	(0.0707)	(0.00883)	(0.00512)
Female	-1.379	-1.023	-0.0453*	-1.195**	0.00994	-1.205**	-0.0290	-0.0439*
	(6.663)	(0.674)	(0.0192)	(0.295)	(0.0484)	(0.251)	(0.0369)	(0.0170)
Attended School Last Year	3.500	-1.249	-0.0377	0.185	0.0122	-0.312	0.0371	0.0623
	(8.670)	(1.013)	(0.0374)	(0.433)	(0.0645)	(0.512)	(0.0545)	(0.0369)
Has Electricity	-5.532	0.681	-0.0104	-0.242	-0.0446	0.0872	0.0187	-0.00711
	(4.807)	(0.818)	(0.0254)	(0.348)	(0.0358)	(0.334)	(0.0331)	(0.0196)
Years of ECE	-6.133	1.099*	0.0223	0.338	-0.0127	-0.0734	0.0256	0.00109
	(5.645)	(0.460)	(0.0160)	(0.216)	(0.0220)	(0.231)	(0.0210)	(0.0138)
Meal Count	-4.554	-0.109	-0.0129	0.177	0.000159	0.178	-0.0611*	0.00894
	(3.054)	(0.402)	(0.0107)	(0.183)	(0.0204)	(0.167)	(0.0249)	(0.0151)
Reads Aloud at Home	-3.817	0.0871	-0.0237	0.347	0.0715*	-0.0410	0.0412	0.00699
	(6.631)	(0.635)	(0.0175)	(0.360)	(0.0328)	(0.326)	(0.0272)	(0.0190)
Asset Index	11.75	0.0239	-0.0191	0.781	-0.0262	0.302	-0.0531	0.0438
	(13.62)	(1.565)	(0.0489)	(0.731)	(0.0631)	(0.730)	(0.0677)	(0.0544)
School Activity with Parent Index	6.443	1.336	0.0582+	0.186	0.0450	0.553	0.122**	0.0222
	(9.075)	(1.841)	(0.0304)	(0.462)	(0.0619)	(0.450)	(0.0368)	(0.0253)
Other Activity with Parent Index	-7.192	-1.247	-0.0238	-0.886+	-0.00408	-0.632	-0.0710	-0.0620
	(11.13)	(1.054)	(0.0227)	(0.498)	(0.0333)	(0.490)	(0.0561)	(0.0417)
Speaks English at Home	3.522	0.953	0.0212	0.616+	0.0218	0.547+	0.0514	0.0352
	(8.092)	(0.623)	(0.0252)	(0.352)	(0.0372)	(0.314)	(0.0413)	(0.0226)
Constant	42.20*	3.850	0.0900	-1.916+	0.479*	1.306	0.304+	0.133
	(17.14)	(2.278)	(0.0685)	(1.040)	(0.190)	(1.376)	(0.172)	(0.0982)
Count	136	305	461	625	320	490	320	490
R-squared	0.169	0.533	0.628	0.575	0.168	0.464	0.189	0.308

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*

We also ran our numeracy panel DiD model on standardized scores. Details of how we standardized the scores can be found in Appendix 8. Again, we standardized our scores to calculate Bridge's effect size and compare Bridge to other education interventions.

Among EGMA subtasks, effect sizes are lower than on EGRA, but still large for an education intervention. The effect sizes for addition 1, subtraction 1, and addition 2 are 0.58, 0.53, and 0.32 standard deviations, respectively.

We also ran two additional panel DiD models to compare Bridge PSL public school and traditional school differences. We found that results for EGMA differed slightly between models but were qualitatively unchanged. In one of the model specifications we include interaction terms with class level and gender. This reduces the power of the model and in that specification we did not find a statistically significant Bridge effect for addition 2. We also found that the Bridge effect for word problems increased in statistical significance due to an increased co-efficient size. The two additional model specifications and their results can be found in Appendix 10.

See Table 13 below for the detailed standardized results.

Table 13. EGMA Results (Standardized Scores)

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	-0.194	0.123+	0.0866	0.580**	0.319*	0.534**	0.348+	0.197+
	(0.175)	(0.0649)	(0.0785)	(0.0833)	(0.128)	(0.0815)	(0.181)	(0.0996)
Student in Grade 1		-0.0112	-0.0279	0.0679				
		(0.0493)	(0.108)	(0.129)				
Student in Grade 2			0.251*	0.286*		0.225*		0.357**
			(0.116)	(0.132)		(0.107)		(0.123)
Student in Grade 3				0.405**	0.233+	0.347**	-0.00627	0.302**
				(0.128)	(0.132)	(0.103)	(0.182)	(0.110)
Baseline Task Score	0.406+	0.882**	0.768**	0.717**	0.285**	0.651**	0.182+	0.495**
	(0.195)	(0.0891)	(0.0801)	(0.0514)	(0.0840)	(0.0538)	(0.0920)	(0.0888)
Baseline Task Score ^2	-0.0540	-0.148**	-0.210**	-0.0171	-0.0683	-0.130	-0.478**	-0.00929
	(0.204)	(0.0193)	(0.0600)	(0.0660)	(0.0771)	(0.0822)	(0.0953)	(0.0406)
Baseline Task Score ^3	-0.0430	0.00602**	0.0374	-0.0124	0.0161	0.00607	0.180**	-0.0322
	(0.171)	(0.00141)	(0.0395)	(0.00831)	(0.0494)	(0.00869)	(0.0415)	(0.0288)
Age	0.0460	-0.000880	0.0285*	0.0613**	-0.0609+	0.0142	-0.0257	0.00776
	(0.0301)	(0.0102)	(0.0127)	(0.0136)	(0.0331)	(0.0171)	(0.0336)	(0.0197)
Female	-0.0421	-0.0585	-0.147*	-0.270**	0.0340	-0.292**	-0.110	-0.169*
	(0.203)	(0.0385)	(0.0622)	(0.0666)	(0.165)	(0.0607)	(0.140)	(0.0656)
Attended School Last Year	0.107	-0.0715	-0.122	0.0416	0.0417	-0.0754	0.141	0.240
	(0.265)	(0.0580)	(0.121)	(0.0978)	(0.220)	(0.124)	(0.207)	(0.142)
Has Electricity	-0.169	0.0389	-0.0336	-0.0546	-0.153	0.0211	0.0711	-0.0274
	(0.147)	(0.0468)	(0.0824)	(0.0785)	(0.122)	(0.0808)	(0.126)	(0.0754)
Years of ECE	-0.187	0.0629*	0.0721	0.0762	-0.0435	-0.0178	0.0976	0.00421
	(0.172)	(0.0263)	(0.0519)	(0.0487)	(0.0751)	(0.0560)	(0.0798)	(0.0531)
Meal Count	-0.139	-0.00622	-0.0418	0.0400	0.000543	0.0430	-0.233*	0.0344
	(0.0932)	(0.0230)	(0.0347)	(0.0412)	(0.0696)	(0.0403)	(0.0946)	(0.0581)
Reads Aloud at Home	-0.116	0.00498	-0.0767	0.0783	0.244*	-0.00991	0.157	0.0269
	(0.202)	(0.0363)	(0.0565)	(0.0812)	(0.112)	(0.0789)	(0.103)	(0.0734)
Asset Index	0.359	0.00137	-0.0617	0.176	-0.0894	0.0731	-0.202	0.169
	(0.416)	(0.0895)	(0.158)	(0.165)	(0.216)	(0.177)	(0.258)	(0.210)
School Activity with Parent Index	0.197	0.0764	0.188+	0.0420	0.154	0.134	0.466**	0.0854
	(0.277)	(0.105)	(0.0984)	(0.104)	(0.212)	(0.109)	(0.140)	(0.0976)
Other Activity with Parent Index	-0.219	-0.0713	-0.0771	-0.200+	-0.0140	-0.153	-0.270	-0.239
	(0.340)	(0.0602)	(0.0736)	(0.112)	(0.114)	(0.119)	(0.213)	(0.160)
Speaks English at Home	0.107	0.0545	0.0688	0.139+	0.0745	0.133+	0.196	0.136
	(0.247)	(0.0356)	(0.0817)	(0.0795)	(0.127)	(0.0761)	(0.157)	(0.0872)
Constant	0.515	0.202	0.401	-0.761**	0.862	0.0956	0.988	-0.510
	(0.716)	(0.147)	(0.279)	(0.244)	(0.632)	(0.360)	(0.634)	(0.360)
Count	136	305	461	625	320	490	320	490
R-squared	0.169	0.533	0.628	0.575	0.168	0.464	0.189	0.308

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*

6.2.3. Comparison of Effect Sizes

Bridge's results translated into effect sizes were positive, large, and statistically significant on eight of the thirteen reading and math measures used. See Tables 14 and 15 below.

Table 14. Comparison of Literacy Effect Sizes

Early Grade Reading	
Letter Sounds	1.90
Onset Sounds	0.00
Non-word Reading	0.68
Familiar Word Reading	0.51
Passage Fluency	0.81
Reading Comprehension	0.71
Average	**0.77**

Table 15. Comparison of Numeracy Effect Sizes

Early Grade Math	
One-to-One Correspondance	0.00
Number Identification	0.00
Quantity Discrimination	0.00
Addition 1	0.58
Addition 2	0.32
Subtraction 1	0.53
Subtraction 2	0.00
Word Problems	0.00
Average	**0.18**

Compared to the standard 0.2 SDs as the benchmark for educational interventions in one year, the effect sizes detected in under 4 months are quite promising. 0.2 SDs is often the go-to measure used to conduct power calculations for education interventions; in other words, researchers will make sure that the sample size in their study is large enough to detect an effect size of 0.2 SD. In addition, a guide to charter school studies notes "Although there is some debate, researchers generally consider an effect size of .1 of a standard deviation as slight, .2 or .3 as moderate, and .5 as large." [46]

It is also important to recognize that "…standard deviations are merely a measure of dispersion – and this is not constant across samples. So an intervention delivering the same absolute increment in learning would look less effective in a context with high variance in test scores than in another with low variance."[47] One year gains as measured in standard deviations also tend to be larger in early grades.[48] As such, it is useful to examine these gains in the context of other early grade studies, particularly in Liberia. The effect sizes detected here in under 4 months remain laudable; an early grade reading intervention lasting 18 months in Liberia yield an overall effect size of 0.79 SD.[49]

[46] L. Rainey 2015, "Making Sense of Charter School Studies," Center on Reinventing Public Education.
[47] A. Singh 2015, "How standard is a standard deviation? A cautionary note on using SDs to compare across impact evaluations in education", World Bank Development Impact.
[48] For example, 0.2 SDs is approximately the average 1 year gain in English and math in upper grades in the United States, but ranges from .36 to 1.52 SDs in early grades. See Hill, C. J., Bloom, H. S., Black, A. R. and Lipsey, M. W. (2008), Empirical Benchmarks for Interpreting Effect Sizes in Research. Child Development Perspectives, 2: 172–177.
[49] These results are from the EGRA Plus project, with Research Triangle Institute (RTI) and FHI360. See Gove, A., Mora, A. & McCardle, P. (2017). Progress toward a literate world: early reading interventions in low- and middle-income countries: new directions for child and adolescent development, number 155. San Francisco: John Wiley and Sons, Inc.

7. Progress Towards Country Benchmarks for Reading

7.1 Improvements in % of Students Reaching Literacy Benchmarks

Another useful indicator for comparing the performance of different student groups is the set of literacy benchmarks for grades 1-3 established at a workshop organized in 2014 by Liberian Ministry of Education officials and USAID.[50] These benchmarks are tied to three specific literacy skills: non-word reading, reading fluency, and reading comprehension.

For each of these literacy skills in grades 1 through 3, both a level benchmark (% questions correct or # correct per minute) and a goal for the student population (% of students at benchmark by 2019) was established. See Table 16 below.

Table 16. Reading Benchmarks

	Non-word Reading (Non-words per Minute)	Reading Fluency (Words per Minute)	Reading Comp. (% Questions Correct)
Grade 1			
Score	5-10	30-40	40-60%
% of Students Reaching by 2019	25-40%	30-50%	30-45%
Grade 2			
Score	10-15	35-40	40-60%
% of Students Reaching by 2019	25-40%	40-50%	40-50%
Grade 3			
Score	10-20	45-50	60-80%
% of Students Reaching by 2019	30-40%	40-50%	45-50%

All three of these literacy skills correspond directly with subtasks we used to measure the progress of students both in Bridge PSL public schools and traditional public schools. Table 17 below shows the percentage of students in grades 1-3 that have met the benchmark scores at Bridge PSL public schools and traditional public schools, for both baselines and midlines.

Table 17. Progress on Reading Benchmarks
Bridge PSL Public Schools vs. Traditional Public Schools

	Bridge PSL Public Schools			Traditional Public Schools			Difference		
	Non-Word Reading	Reading Fluency	Reading Comp	Non-Word Reading	Reading Fluency	Reading Comp	Non-Word Reading	Reading Fluency	Reading Comp
Grade 1									
Baseline	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	-1.0%	0.0%	0.0%
Midline	9.0%	5.1%	2.6%	2.1%	0.0%	0.0%	6.9%*	5.1%*	2.6%
Improvement Over Time	9.0%	5.1%	2.6%	1.0%	0.0%	0.0%	7.9%*	5.1%*	2.6%
Grade 2									
Baseline	1.1%	1.1%	1.1%	1.4%	0.0%	0.0%	-0.4%	1.1%	1.1%
Midline	6.5%	18.3%	16.1%	4.3%	4.3%	4.3%	2.1%	13.9%**	11.8%*
Improvement Over Time	5.4%	17.2%	15.1%	2.9%	4.3%	4.3%	2.5%	12.9%*	10.7%*
Grade 3									
Baseline	1.1%	2.2%	2.2%	0.0%	1.3%	0.0%	1.1%	0.8%	2.2%
Midline	7.5%	21.5%	14.0%	2.6%	7.9%	3.9%	4.9%	13.6%*	10.0%*
Improvement Over Time	6.5%	19.4%	11.8%	2.6%	6.6%	3.9%	3.8%	12.8%*	7.9%+

*+ p<0.10, * p<0.05, ** p<0.01*

[50] Liberia Early Grade Reading Benchmarks found at https://globalreadingnetwork.net/eddata/proposing-benchmarks-early-grade-reading-skills-liberia

We are encouraged by the fact that Bridge PSL public schools have shown greater progress than traditional public school in the direction to meet the 2019 learning goals, across all three benchmarks.

In non-word reading, the criteria were quantified based on the number of three letter combinations that a student can correctly decode and pronounce in one minute. The non-word reading instrument we used actually had both three and four-letter combinations and was more difficult in level than what the benchmark developers suggested. The improvement between the baseline assessment and midline assessment was higher in Bridge PSL public schools than it was in traditional public schools by 7.9 percentage points in Grade 1.

In reading fluency, the baseline results show few Bridge PSL public school or traditional public school students achieving benchmark scores. However, the midline results showed larger increases in Bridge PSL public schools than in traditional public schools. The increase in percentage of pupils meeting the benchmark scores in Bridge PSL public schools outstripped that of traditional public schools by 5.1 percentage points in Grade 1, 12.9 percentage points in Grade 2, and 12.8 percentage points in Grade 3.

In reading comprehension, results were similar. Again, almost none of the students in grades 1, 2 or 3 at either Bridge PSL public schools or traditional public schools reached the benchmark score on the baseline assessment. Once again, on the midline assessments, the percentage of Bridge PSL public school students achieving benchmark levels jumped to 2.6% in Grade 1, 16.1% in Grade 2, and 14.0% in Grade 3. The percentage also increased slightly in Grade 2 and Grade 3 at traditional public schools, but the increase lagged behind that of Bridge PSL public schools by 10.7 percentage points in Grade 2.

This information is best used as an additional (rather than the only) metric of Bridge PSL's performance as a school system, as it is sensitive to the original percentage of pupils who were close to meeting the benchmark in the first place.[51]

7.2 Reduction in % of Students with Zero Scores

The benchmarking workshop also established goals for reducing the percentage of students who score zeros on these three literacy skill assessments – in other words – the percentage of students who cannot read any words or non-words, or cannot answer any reading comprehension questions correctly. Their proposed percentage range for each grade and literacy skill is shown in Table 18 below.

Table 18. Zero Score Goals in Reading

	Non-word Reading (Non-words per Minute)	**Reading Fluency** (Words per Minute)	**Reading Comprehension** (% Questions Correct)
% of Grade 1 Scoring Zero	25-50%	15-35%	30-50%
% of Grade 2 Scoring Zero	25-40%	15-20%	25-30%
% of Grade 3 Scoring Zero	25-35%	5-15%	20-30%

We compare the percentage zero scores of assessed Bridge PSL public schools and traditional public schools for grades 1-3 in Table 19 below.

[51] For example, take the case of School A that had X% of pupils that were right below the benchmark at baseline versus School B that had the same X% of pupils below the benchmark at baseline, but just further below the benchmark on an absolute level. The two schools may have created the same amount of gains for their pupils on average, but if School B's pupils still did not meet this absolute standard, School A's performance would look much better.

Table 19. Reduction in Zero Scores
Bridge PSL Public Schools vs. Traditional Public Schools

	Bridge PSL Public Schools			Traditional Public Schools			Difference		
	Non-Word Reading	Reading Fluency	Reading Comp	Non-Word Reading	Reading Fluency	Reading Comp	Non-Word Reading	Reading Fluency	Reading Comp
Grade 1									
Baseline	97.4%	60.3%	96.2%	96.9%	76.3%	94.8%	0.5%	-16.0%*	1.3%
Midline	76.9%	32.1%	82.1%	89.7%	64.9%	96.9%	-12.8%*	-32.9%**	-14.9%**
Reduction in Zero Scores	-20.5%	-28.2%	-14.1%	-7.2%	-11.3%	2.1%	-13.3%*	-16.9%+	-16.2%**
Grade 2									
Baseline	84.9%	28.0%	88.2%	89.9%	50.7%	95.7%	-4.9%	-22.8%**	-7.5%+
Midline	60.2%	17.2%	65.6%	62.3%	44.9%	84.1%	-2.1%	-27.7%**	-18.5%**
Reduction in Zero Scores	-24.7%	-10.8%	-22.6%	-27.5%	-5.8%	-11.6%	2.8%	-5.0%	-11.0%+
Grade 3									
Baseline	86.0%	20.4%	79.6%	88.2%	27.6%	78.9%	-2.1%	-7.2%	0.6%
Midline	64.5%	11.8%	59.1%	78.9%	22.4%	65.8%	-14.4%*	-10.5%+	-6.6%
Reduction in Zero Scores	-21.5%	-8.6%	-20.4%	-9.2%	-5.3%	-13.2%	-12.3%+	-3.3%	-7.3%

*+ p<0.10, * p<0.05, ** p<0.01*

Bridge PSL public schools once again show greater progress toward these benchmarks than traditional public schools. In fact, in reading fluency, the percentage of Bridge PSL public school students scoring zero on the midline assessments is 32.1% in Grade 1, 17.2% in Grade 2, and 11.8% in Grade 3, already within the proposed percentage range for all three grades. Bridge PSL public schools also had a lower percentage of students starting out with zero scores at each grade level, so more of their students were closer to the established benchmarks. Traditional public schools have also improved between the baseline and midline in reading fluency, but their improvement is less than in Bridge PSL public schools by 16.9 percentage points in Grade 1, 5 percentage points in Grade 2, and 3.3 percentage points in Grade 3.

In reading comprehension and non-word reading, the percentage zero scores on the midline assessments are not yet within the benchmark ranges, but they have shown significant reductions from the baseline, especially in Bridge PSL public schools. In reading comprehension, the reduction in Bridge PSL public schools percentage zero scores exceeded those in traditional public schools by 16.2 percentage points in Grade 1, 11 percentage points in Grade 2, and 7.3 percentage points in Grade 3. Only for Grade 2 non-word reading did improvement at traditional public schools exceed the improvement in Bridge PSL public schools, and there it was only by 2.8 percentage points. In Grade 1 and Grade 3, the reduction in zero scores between the baseline and midline was greater in Bridge PSL public schools by 13.3 percentage points and 12.3 percentage points respectively.

8. Limitations

8.1 Sample Attrition

One of our main concerns is attrition; 22% of students in our study sample were not in school on the day of midline assessments, making it impossible to collect data on their outcomes. Unfortunately, tracking students outside of their baseline school is cost-prohibitive for the scope of this study, so we were therefore constrained by the schedules of comparison schools and whether or not students happened to be absent during assessment days. Where students moved grade levels however, we did our best to locate them within their baseline school, and their results are analyzed per their starting grade level.

8.1.1 Why Sample Attrition is a Concern

Two types of attrition can occur in a study: equivalent attrition and differential attrition. Equivalent attrition occurs when individuals from the groups being compared attrite, but each group's composition remains

the same.[52] Differential attrition occurs when attrition patterns are different for a particular type of student or vary across comparison groups.

A study in the American Journal of Public Health points out that the real concern is not necessarily high attrition itself, which frequently happens in highly mobile populations, but differential attrition.[53]

Why? Differential attrition has critical implications for how analyses and results are examined. Both forms of differential attrition, if they exist, pose serious limitations to what we should take away from this study:

1. If a particular type of student is more likely to leave the study sample, this is a concern because it results in inaccurate measure of the magnitude of an intervention's effect, which ultimately can lead to biased estimates of results.[54] Furthermore, it means that the sample now looks different from the population it was meant to represent, and the results may no longer be generalizable to the larger context.[55]

   Example 1: Is a particular type of student (e.g. high- vs. low-performing) leaving our sample overall? Say, for instance, that low-performing students are the ones dropping out of the sample, such that the effects we find are driven by more high-performers remaining in the sample. Does this mean that any effects we find would not be generalizable to all types of students?

2. If a particular type of student is more likely to leave a Bridge PSL public school or traditional public school, this is a concern because now there are systematic differences between comparison groups. This means that the results may be just as much of a function of the student composition as of the actual treatment effect.

   Example 2: Are different types of pupils (e.g. high- vs. low-performing) leaving our sample at different rates depending on school type? If a significantly greater proportion of high-performing students leave traditional schools and these same students are more likely to make greater gains over time, the estimate of Bridge's effect would be biased in the latter's favor. This is because Bridge PSL public schools, unlike traditional public schools, are left with a higher-performing sample of students over time.

The question therefore becomes whether there is *differential* attrition and, if there is, what we can do about it to make our findings more robust.

8.1.2 Testing for Differential Attrition

The most straightforward way to conduct a test for non-random attrition is to examine the probability of attrition given information we have on both attrited and non-attrited students.[56] We ran three different specifications in order to balance between including all baseline information and losing power due to too many interaction effects. Two of the three regression specifications also test to see if baseline information predicts attrition differently at Bridge PSL public schools than at traditional public schools. All three

[52] While this type of attrition does not lead to systematic differences between the treatment group and the control group, it often raises concerns at high levels. The inclusion criteria for behavioral intervention studies, for example, require retention rates of at least 70%. The CDC follows a similar logic, requiring retention to be at least 70% for an intervention to be classified as "effective" and 60% for "promising".

[53] Amico (2009)

[54] What Works Clearinghouse, v2.1

[55] Miller and Hollist (2007)

[56] According to the Chronic Poverty Research Centre (CPRC) supported by DFID, "the simplest test for whether attrition is random is to estimate a probit in which the dependent variable takes the value one for households which drop out of the sample after the first wave (attrite) and zero otherwise. Explanatory variables are baseline values for all variables that are believed to affect the outcome variable of interest plus any available variables which characterize the interview process. It is usual to include lagged values of the outcome variable in such attrition probits. As pointed out by Outes-Leon and Dercon (2008), it is also useful to examine the pseudo R-squared from attrition probits, as they can be interpreted as the proportion of attrition that is nonrandom." (Baulch, B. and Quisumbing, A., 2011)

specifications and their results are included in Appendix 9. Here we discuss the results from the following, most comprehensive, model, which we ran for each subtask:

$$attrite = \beta_0 + \beta_1(Bridge) + \beta_2(grade\ 1) + \beta_3(grade\ 2) + \beta_4(grade\ 3) + \beta_5(grade\ 1*Bridge) + \beta_6(grade\ 2*Bridge) + \beta_7(grade\ 3*Bridge) + \beta_8(baseline\ subtask\ score) + \beta_7(baseline\ subtask\ score*Bridge) + \beta_8(baseline\ characteristics) + \beta_9(baseline\ characteristics*Bridge) + \varepsilon$$

This comprehensive probit model considers a number of factors, including: (1) school type; (2) student baseline test scores; (3) the interaction of student baseline test scores and school type; (4) a set of baseline characteristics, which includes: age, gender, years of ECE; whether the student went to school last year; whether the student has electricity at home; whether the student reads aloud at home; the meal count of the student within a day of baseline testing; ownership of cellphone, TV, and radio; whether the student does homework or reads with parents; whether the student watches TV or listens to the radio with parents; whether the student speaks English at home; (5) the interaction of this set of baseline characteristics with school type.

Note that factors (1), (2), and (4) test the first form of differential attrition, which considers whether different types of students (i.e., high-performing vs. low-performing) are more likely to attrite from our sample. (3) and (5) test the second form of differential attrition, which considers whether different types of students (i.e., high-performing vs. low-performing) from a particular school type are more likely to attrite from the treatment sample school type than another school type.

Again, the results of these probit regressions are in Appendix 9 and summarized below.

First, we find that the level of attrition is the same for both school types. In other words, students attending Bridge PSL public schools and traditional schools are equally likely to attrite from the sample. This generally makes sense, as neither school type charges fees (one of the largest drivers of attrition).

Second, in comparison to traditional public schools, we find that 2nd graders at Bridge PSL public schools are less likely to attrite. This is particularly significant in the regressions run on literacy related sub-tasks.

Finally, students who scored higher on the baseline familiar word reading, passage fluency and word problem subtasks at Bridge PSL public schools were less likely to attrite. As this has implications for what we can and cannot take away from the study, we plan to investigate the issue further in our next report after endline data is available.

8.2 Time-of-Day Student Assessment and School Survey Differentials

The pilot study team leveraged the longer school day at Bridge PSL public schools to reduce fieldwork costs; by visiting a traditional public school in the morning and its matched Bridge PSL public school in the afternoon, more assessments could be conducted in a single day. At baselines, 88% of students at traditional public schools were assessed before noon compared to 52% of students at Bridge PSL public schools. During midlines, the difference is even greater – more than 99% of students at traditional public schools were assessed before noon compared to 25% of student at Bridge PSL public schools.

This field schedule also affects when a principal interview and observational survey were conducted; all were done in the morning for traditional public schools versus a third for Bridge PSL public schools.

Unfortunately, this may bias results in two ways. To the extent that student performance on assessments is better in the morning than in the afternoon[57], we may have underestimated the gains made by students at Bridge PSL public schools. Similarly, to the extent that both teachers and students are more likely to be

[57] Pope, N. G. (2016). How the time of day affects productivity: Evidence from school schedules. Review of Economics and Statistics, 98(1), 1-11.

present in the morning than in the afternoon, attendance levels as measured by field team observations may also be biased downwards against Bridge PSL public schools.

For endlines, we will revisit the trade-off of additional costs versus time-of-day biases. Because we have timestamps on each assessment conducted, we can examine how student performance is affected by when the assessment is conducted. We will also explore conducting school observations twice – once in the morning and once again in the afternoon, on randomly selected days within the time the field team is present for student assessments. This not only can correct potential biases on attendance in our summary statistics, it also allows for exploration of absenteeism by time of day.

9. Next Steps

The purpose of this report is to document and examine results of the baseline and midline data collection efforts, which provides detailed information about early grade literacy and numeracy at both Bridge PSL public schools and traditional public schools.

At baseline, we saw that the Bridge PSL public school sample had some differences in comparison to traditional public schools, though differences were either due to treatment (placement tests into grade levels) or are generally negligible. We control for such factors in our midline analysis. At midline, we found that students at Bridge PSL public schools made greater gains than their peers at traditional public schools.

This data will also allow Bridge PSL public schools and the traditional public schools to have information on student learning levels and adjust programs accordingly. Seeing how differences in school management and programs may lead to changes in learning levels is key to the Partnership School for Liberia program, and will be useful in policy formation to ensure equitable access to quality schools across the country.

In future iterations of this report, we hope to conduct additional analyses and robustness checks, such as examining differential attrition by quintile baseline scores and adopting a matching technique to create a more balanced treatment and control group of students.

Our final round of data collection will be in June and July 2017. We will return to the same 12 schools to conduct assessments to measure students' growth.

Appendix

A1. Randomization Strategy

To ensure that our samples are randomized in a way that takes into account gender proportions for given classes, field team leaders followed the six steps detailed below.

The most important numbers to keep in mind for this sampling strategy are the **interval** by which students will be selected and the **percentages of girls and boys**.

1. **Separate Students by Gender:** Ask students to form two lines – one line for boys and one line for girls. If there are multiple streams for a class, collect *all* students and separate them out by boys and girls.

2. **Determine the Total Number of Students for the Class:** Count the number of girls and the number of boys to find the total number of pupils. Example:

   Number of Girls = 5
   Number of Boys = 10
   Number of Girls + Number of Boys = 5 + 10 = 15
   We have a total of 15 students in the class we are assessing.

3. **Calculate the Target Interval Number:** Take the **total number of students** and divide it by the target number of students. Example:

   Total number of students = 15
   Target sample number = 5

   $$\frac{Total\ Number\ of\ Students}{Target\ Sample\ Number} = \frac{15}{5} = 3$$

   Based on the equation above, we find that our **target interval number** is 3.

4. **Calculate the Gender Ratios:** Calculate the ratio of girls to the total number of students and the ratio of boys to the total number of students in the class being assessed. To determine the ratio of girls, divide the number of girls in the class by the total number of students.

   $$\frac{Number\ of\ Girls}{Total\ Number\ of\ Students} = \frac{5}{15} = \frac{1}{3} \rightarrow \text{Ratio of Girls} = \frac{1}{3}$$

   $$\frac{Number\ of\ Boys}{Total\ Number\ of\ Students} = \frac{10}{15} = \frac{2}{3} \rightarrow \text{Ratio of Boys} = \frac{2}{3}$$

5. **Calculate Number of Boys and Girls Required for the Sample:** Multiply the ratios found in step 4 by the target sample number to determine exactly how many girls and how many boys should be in the final sample. If the calculation yields a decimal, keep the following in mind: if the decimal is less than 0.5, round down. If the decimal is 0.5 or higher, round up. Example:

   Girls: Multiply the ratio of girls ($\frac{1}{3}$) by the target sample number (5).

   So: $\frac{1}{3} * 5 = 1.7$. We should have 2 girls in our final sample.

Boys: Multiply the ratio of boys ($\frac{2}{3}$), by the target sample number (5).

So: $\frac{2}{3} * 5 = 3.3$. We should have 3 boys in our sample.

6. **Identify the Students for the Sample:** Use the interval to separately identify the girls and boys who will be in the sample and be assessed. See the tables below for which students would be selected, based on our calculations in steps 1 through 5. Our interval number was 3, so count every third girl and third boy. For the girls, once you've reached the fifth girl (who would be 2), start back at the top.

Random Selection - Example

Girls

G	**2nd Selected Girl**
G	
G	**1st Selected Girl**
G	
G	

Boys

B	
B	
B	**1st Selected Boy**
B	
B	
B	**2nd Selected Boy**
B	
B	
B	**3rd Selected Boy**
B	

A2. EGRA & EGMA Subtask Descriptions

1. Letter Sounds

The Letter Sound Knowledge task tests a basic ability to connect each letter to its corresponding sound or sounds. As the first phase in the development of reading skills, letter sound knowledge is related to the ability to decode non-words and read fluently. The assessor asks the pupil to make the sound that the given letter represents, rather than the name of the letter. For example, a correct response when pointing to the letter "A" would be to make the sound "AH". An incorrect response would be "A", since that is the name of the letter and not the sound it makes. The assessor stops the task after 60 seconds. If the pupil reads all of the letter sounds before 60 seconds have passed, the assessor notes the amount of time remaining.

2. Onset Sounds

EGRA tests phonemic awareness in through identification of onset (first) sounds. For identifying onset sounds, the assessor reads aloud three words, asking the student to identify the word that begins with a different sound. For example: "Which word begins with a different sound: top, touch, stand?" The assessor is not allowed to repeat the list. There is 3-second move on rule.

3. Non-word Reading

The Non-word Reading task (also sometimes called the "Invented" or "Unfamiliar Words" task) measures a pupil's decoding ability and is designed to detect problems of sight recognition of words. Examples in English include "fet," "caz," "lut," and "bleb." Many children in the early grades learn to memorize or recognize a broad range of "sight words" (words that primary school children are taught to recognize on sight, as many of these words are not easy to sound out phonetically, and thus must be memorized). Successful readers avoid memorization of text and combine both decoding and sight recognition skills. Testing for how well a child can decode invented words provides a better estimate of the child's ability to read unfamiliar words that fall outside his/her sight recognition vocabulary. Pupils are asked to read as many "non-words" as they can in one minute; the assessor then records the number of non-words the pupil read correctly. If the pupil reads all of the non-words before 60 seconds have passed, the assessor notes the amount of time remaining.

4. Familiar Word Reading

The Familiar Word Reading task tests pupils' ability to read simple, common one- and two-syllable words. One way to examine reading fluency is by assessing how well a pupil can read a paragraph. However, for the purposes of measuring word recognition and decoding skills, a better method is to assess how well the pupil can read a list of unrelated words. That way, the pupil cannot simply guess the next word from the context provided by surrounding words. For this assessment, familiar words are common words selected from early grade reading materials and storybooks for first-, second-, and third-grade materials (progressively increasing in difficulty). Pupils are asked to read as many familiar words as they can in one minute; the assessor times the pupil and records the number of correct familiar words read per minute. If the pupil reads all of the familiar before 60 seconds have passed, the assessor notes the amount of time remaining.

5. Passage Fluency

The Passage Fluency task requires that pupils read a text with high accuracy and good speed. This task measures overall reading competence: the ability to translate letters into sounds, unify sounds into words, process connections, relate text to meaning, and make inferences to fill in missing information. As skilled readers translate text into spoken language, they combine these tasks in a seemingly effortless manner; because oral reading fluency captures this complex process, it can be used to characterize reading skill. The pupil is given one minute to read the passage.

6. Reading Comprehension

The Reading Comprehension task requires pupils to respond correctly to different types of questions, including literal and inferential questions about the text they have read aloud. Assessors ask pupils to read a passage, stopping them after 1 minute and recording the number of words read. Then, pupils are asked comprehension questions that include direct, fact-based questions, as well as at least one question requiring inference from the text. Poor performance on a reading comprehension task would suggest that the pupil has trouble with decoding, or with reading fluently enough to comprehend, or with vocabulary.

Please note that this analysis calculates the percentage of correct answers out of a total of five questions. However, the number of correct answers a pupil can provide depends on how far in the passage he or she read in the previous task, Passage Fluency. If a pupil did not read quickly enough to finish the entire passage in the previous task, then only some of the 5 comprehension questions were not administered: pupils were asked as many questions in Reading Comprehension as were answerable, given the number of sentences read in the Passage Fluency task. Pupils were therefore only asked the questions that corresponded with the portion of the passage that they were able to read during the timed exercise. While this scoring method differs from how reading comprehension is generally scored, upon consultation with our academic team, we believe this method more clearly represents differences in pupil learning.

6. One-to-One Correspondence

The One-to-One Correspondence task refers to counting objects. Children use two processes that need to work together: (1) recognizing the items they need to count and (2) recognizing and mentally flagging those items that

have already been counted. Flagging can be done physically by pointing to the item to keep track of those items still needing to be counted, as well as those that have already been counted. Pupils count circles on a sheet of paper. They are then evaluated on (1) the last circle they counted correctly, and (2) whether they understand that the last number they said aloud for the circle they stopped at is equal to the total number of circles counted.

7. Number Identification

The Number Identification task aims to establish an understanding of a child's knowledge and identification of written symbols. Pupils orally identify printed number symbols that are randomly selected and placed in a grid. Children should understand that printed numerals represent whole numbers, and recognize these numbers by their associated number-words. Additionally, they should be able to compare and order them. In this task, each child is given a random sampling of numbers from 1 through 100 for the first 15 items, and a random sampling of numbers from 101 through 1000 for the next 5 items. They identify the numbers presented to them in a timed exercise of 60 seconds.

8. Quantity Discrimination

The Quantity Discrimination task measures children's ability to make judgments about differences by comparing quantities. This skill is tested using numbers or objects, such as circles, and asking which group has more. Quantity discrimination demonstrates a critical link to an effective and efficient counting strategy for problem solving. For instance, when a pupil needs to solve an addition problem such as 6 + 3, it is important that they quickly identify that 6 is the bigger number. Pupils who count up from the "bigger number" have learned an effective strategy and also make fewer errors in solving these problems.

9-12. Addition 1, Addition 2, Subtraction 1, & Subtraction 2

For all four addition and subtraction tasks (Addition 1, Addition 2, Subtraction 1, Subtraction 2), pupils are shown a written representation of the mathematics problem (i.e. an equation. Two levels of addition and subtraction tasks test pupils on slightly different levels of difficulty.

A pupil is free to use any method or combination of methods to add and subtract. Possible methods include using fingers, making tick marks on paper with a pen, writing out the problem on the paper with pen, using counters made available to them, or solving problems mentally. If a pupil has not responded or attempted to solve a problem after 10 seconds, the assessor may prompt him or her once, wait 5 seconds, and he or she still does not respond, mark as no response and continue to the next problem. For the addition, subtraction, and word problem tasks below, we include a summary table and an additional graph, which highlights the methods used. Note that each pupil may use more than one method to solve a problem.

13. Word Problems

The Word Problems task frames statements to help analyze a child's informal concepts of addition and subtraction. For example, to combine or join two quantities in a word problem is the same as adding or figuring out the sum of two numbers. To assess the strategies children use to solve such problems, the assessor reads the entire word problem to a child before he/she can begin the task. If the child needs word problem reread, the interviewer rereads it. Each question may be repeated one time at the pupil's request. The child can also use the provided counters in solving the problems.

A3. Monitoring

To ensure that data collection occurred as scheduled and that the field team was conducting enough assessments in each of the 12 schools, the M&E team established a number of processes to monitor daily progress.

Student Assessment Lists

The M&E team created student assessment lists for each school and grade. Field team leaders were responsible for completing these during their visits to each school. The assessment lists aimed to capture information such as: date of the assessment, beginning and end times of the assessment, student's unique randomly generated

Tangerine ID, assessor's name, student's full name, and student's gender. This information was then used to a) cross-check that data have not been falsified, b) match students, and c) identify schools that the field team needed to re-visit.

Daily Data Downloads

Data was downloaded from Tangerine each day during data collection in the evening. These downloads were also backed up. The M&E team used this data to check on which schools had or had not yet been visited.

Student Counts

Using the daily data downloads, the M&E team calculated the number of completed assessments at each school to determine student counts. Once these student counts had been tallied, short reports were sent to each field team to identify outstanding issues (i.e. missing data in Tangerine – schools scheduled to be visited had no assessments, student shortfalls in schools already visited, etc.).

A4. Student Characteristics

A4.1 Description of Information Collected

Age

Each student was asked how old he or she is. Self-reported ages ranged from 0 to 24. We also included an "answer extremely unlikely" option for students whose stated ages were unlikely to be correct. 10% of ages were noted as unlikely by our assessors.

Gender

Each assessor was asked to record the gender of the student being assessed.

School Attended Last Year

Each student was asked if he or she went to "this school last year". If the student responded no, the assessor asked "did you go to school last year?" and recorded the name of the school down if the student said yes and could provide it.

ECE Attendance

Depending on the grade of the student being tested, students were asked if (1) they had attended Beginner class, (2) if they had attended Nursery class, and (3) if they had attended Kindergarten. Students in Nursery class, for instance, were not asked if they had attended Kindergarten.

- *% Attended 1+ Year of ECE:* If students attended Beginner, Nursery, or Kindergarten (or any combination of these), they were counted as having attended at least one year of ECE and included in this percentage.
- *If Attended ECE, # of Years*: Recorded as one year per ECE grade level the student reported to have attended.

An important caveat is that there may be errors in self-reported information (rather than actual differences between groups). Students may not remember whether they attended a particular ECE class the further away they are from that time period in their lives. Alternatively, older students may be more likely to state that they attended ECE even when they did not, due to their interest in providing a socially desirable response.

Language Spoken at Home

Students were asked to specify the languages that they speak at home. We provided a list of languages most commonly spoken in Liberia, as well as English. From these responses, we were able to calculate the following:

- % Speak English at Home

Meals

Students were asked three different questions about the meals that they had eaten both the day prior to and the day on which they were assessed. We then measured the following:

- % Ate Lunch Day Before
- % Ate Dinner Day Before
- % Ate Breakfast Morning of Assessment

Reading at Home

Students were asked if someone read with them at home, and if so, who (e.g., mother, father, grandparent, etc.). We used student responses to calculate the following:

- % Someone Reads at Home
- If Someone Reads, % Mother or Father

Homework Assistance

Students were asked if someone assisted them with their homework, and if so, whom (e.g., mother, father, grandparent, etc.). Student responses were used to calculate the following:

- % Someone Helps with Homework
- If Someone Helps, % Mother or Father

Cellphone

Students were asked if anyone has a cellphone in his or her home. Student responses were used to calculate the variable "% Has Cellphone"

Radio

Students were asked a series of questions about radios: (1) did the student have a radio in his or her home, (2) did the student listen to the radio, and (3) if so, who did the student listen to the radio with (e.g., mother, father, uncle, grandparent, and/or friend). Student responses were used to calculate the following:

- % Has Radio
- % Listens to Radio
- % Listens to Radio, % with Mother or Father

Television

Students were asked a series of questions about televisions, including the following: (1) did the student have a TV in his or her home, (2) did the student watch TV, and (3) if so, who did the student listen to the TV with (e.g., mother, father, uncle, grandparent, and/or friend).

- % Has TV
- % Watches TV
- If Watches TV, % with Mother or Father

Electricity

Students were asked if they have electricity in their homes (this was then used to calculate the variable "% Has Electricity").

Asset Index

We calculated an asset index by adding the has cellphone, has radio, and has television at home variables together and dividing by three.

School Activities with Parents Index

We calculated a school activity with parents index by adding the does homework with parents and reads with parents variables together and dividing by two.

Other Activities with Parents Index

We calculated the other activity with parents index by adding the watches TV with parent and listens to radio with parents variables together and dividing by two.

A4.2 Baseline Characteristics of Students in Kindergarten and 1st Grade

Table 20. Characteristics of Kindergarten and 1st Grade Students (All Students at Baseline)

	Kindergarten			1st Grade		
	Bridge	Comparison	B - C	Bridge	Comparison	B - C
Count	80	126		99	118	
Demographics						
Mean Age	8.12	9.72	-1.61**	10.20	11.1	-0.914**
% Female	1.53	1.51	0.017	1.50	1.5	-0.038
Education History						
% Attended School Last Year	0.84	0.88	-0.04	0.94	0.9	0.0426
% Attended Any ECE	0.89	0.97	-0.08**	0.99	1.0	-0.01
Years of ECE	1.39	1.65	-0.263**	2.22	2.8	-0.5418**
% Attended Beginner	0.82	0.84	-0.02	0.79	0.9	-0.13**
% Attended Nursery	0.61	0.81	-0.20**	0.70	0.9	-0.23**
% Attended Kindergarten	1.00	1.00	0.00	0.74	0.9	-0.18**
Meals						
% With No Meals	0.01	0.02	-0.01	0.03	0.0	0.0215
Average # of Meals	2.19	2.07	0.13	2.06	2.3	-0.27*
% Who Had Breakfast	0.59	0.57	0.03	0.61	0.6	-0.007
% Who Had Lunch	0.94	0.87	0.06	0.89	1.0	-0.07+
% Who Had Dinner	0.67	0.63	0.04	0.56	0.8	-0.19**
Assets						
% Has Radio	0.64	0.69	-0.05	0.60	0.6	-0.012
% Has Television	0.19	0.25	-0.06	0.34	0.3	0.0183
% Has Electricity	0.20	0.27	-0.07	0.31	0.3	-0.011
% Has Cellphone	0.75	0.82	-0.07	0.82	0.9	-0.035
Language Exposure						
% Speak English at Home	0.61	0.60	0.01	0.63	0.8	-0.122+
% Listens To Radio	0.55	0.56	-0.01	0.47	0.6	-0.095
% Watches TV	0.39	0.47	-0.08	0.47	0.5	-0.064
Parent Involvement						
% Receive Homework Help	0.53	0.69	-0.16*	0.56	0.7	-0.11+
If Given Help, % by Parent	0.15	0.11	0.04	0.13	0.1	-0.015
% Reads Out Loud with Parent	0.18	0.33	-0.15*	0.33	0.4	-0.061
% Are Read To	0.44	0.46	-0.03	0.36	0.6	-0.20**
If Read To, % by Parent	0.14	0.13	0.01	0.13	0.2	-0.032
If Listens to Radio, % with Parent	0.40	0.43	-0.03	0.33	0.4	-0.097
If Watches TV, % with Parent	0.14	0.22	-0.08	0.27	0.3	-0.037

** p<0.01, * p<0.05, + p<0.1

Table 21. Characteristics of Kindergarten and 1st Grade Students (Students in Baseline and Midline)

	Kindergarten			1st Grade		
	Bridge	Comparison	B - C	Bridge	Comparison	B - C
Count	56	96		78	97	
Demographics						
Mean Age	8.02	9.67	-1.646**	10.19	11.15	-0.958**
% Female	0.50	0.48	0.0208	0.53	0.60	-0.07
Education History						
% Attended School Last Year	0.82	0.89	-0.064+	0.94	0.93	0.01
% Attended Any ECE	0.91	0.98	-0.0685**	0.99	1.00	-0.01
% Attended Beginner	0.82	0.85	-0.0327	0.80	0.91	-0.109*
% Attended Nursery	0.67	0.84	-0.177**	0.68	0.95	-0.268**
% Attended Kindergarten	1.00	1.00	0	0.72	0.94	-0.229**
Meals						
% With No Meals	0.02	0.02	-0.00298	0.03	0.00	0.03
Average # of Meals	2.21	2.04	0.171	2.17	2.37	-0.202+
% Who Had Breakfast	0.61	0.55	0.0598	0.63	0.63	0.00
% Who Had Lunch	0.93	0.89	0.0432	0.91	0.96	-0.0481+
% Who Had Dinner	0.68	0.61	0.0722	0.62	0.77	-0.151*
Assets						
% Has Radio	0.62	0.69	-0.0721	0.58	0.64	-0.05
% Has Television	0.19	0.26	-0.0745	0.34	0.33	0.02
% Has Electricity	0.17	0.26	-0.0938	0.30	0.31	0.00
% Has Cellphone	0.80	0.83	-0.0259	0.78	0.84	-0.06
Language Exposure						
% Speak English at Home	0.64	0.58	0.0595	0.66	0.76	-0.10
% Listens To Radio	0.56	0.54	0.0187	0.43	0.59	-0.159*
% Watches TV	0.34	0.45	-0.108	0.48	0.53	-0.05
Parent Involvement						
% Receive Homework Help	0.56	0.66	-0.105	0.56	0.70	-0.138+
If Given Help, % by Parent	0.16	0.12	0.0461	0.13	0.17	-0.04
% Reads Out Loud with Parent	0.21	0.30	-0.0832	0.36	0.36	0.00
% Are Read To	0.48	0.44	0.0387	0.41	0.53	-0.13
If Read To, % by Parent	0.14	0.12	0.0283	0.16	0.16	0.01
If Listens to Radio, % with Parent	0.45	0.42	0.0298	0.32	0.44	-0.12
If Watches TV, % with Parent	0.11	0.22	-0.112*	0.28	0.31	-0.03

** p<0.01, * p<0.05, + p<0.1

A4.3 Baseline Characteristics of Students in 2nd and 3rd Grade

Table 22. Characteristics of 2nd and 3rd Grade Students (All Students at Baseline)

	2nd Grade			3rd Grade		
	Bridge	Comparison	B - C	Bridge	Comparison	B - C
Count	110	95		117	103	
Demographics						
Mean Age	11.14	12.46	-1.33**	12.78	13.20	-0.418+
% Female	1.53	1.58	-0.051	1.52	1.54	-0.02
Education History						
% Attended School Last Year	0.90	0.90	0.0052	0.91	0.90	0.00
% Attended Any ECE	0.98	1.00	-0.018	0.94	0.98	-0.04
Years of ECE	2.55	2.70	-0.149	2.41	2.69	-0.279**
% Attended Beginner	0.88	0.88	-0.002	0.76	0.86	-0.10
% Attended Nursery	0.81	0.86	-0.054	0.80	0.87	-0.07
% Attended Kindergarten	0.85	0.95	-0.092*	0.86	0.95	-0.10*
Meals						
% With No Meals	0.00	0.00	0	0.03	0.01	0.02
Average # of Meals	2.39	2.20	0.187+	2.04	2.32	-0.273*
% Who Had Breakfast	0.74	0.62	0.126+	0.59	0.61	-0.02
% Who Had Lunch	0.96	0.97	-0.004	0.89	0.96	-0.07+
% Who Had Dinner	0.69	0.62	0.0682	0.56	0.75	-0.18**
Assets						
% Has Radio	0.70	0.76	-0.055	0.72	0.71	0.01
% Has Television	0.26	0.23	0.0378	0.30	0.30	0.00
% Has Electricity	0.34	0.21	0.13*	0.31	0.24	0.07
% Has Cellphone	0.88	0.93	-0.044	0.90	0.90	0.00
Language Exposure						
% Speak English at Home	0.71	0.64	0.067	0.68	0.71	-0.03
% Listens To Radio	0.62	0.60	0.0224	0.55	0.59	-0.04
% Watches TV	0.56	0.53	0.0317	0.49	0.57	-0.08
Parent Involvement						
% Receive Homework Help	0.63	0.79	-0.16*	0.74	0.84	-0.105+
If Given Help, % by Parent	0.26	0.17	0.0952	0.16	0.22	-0.06
% Reads Out Loud with Parent	0.48	0.46	0.0191	0.55	0.57	-0.02
% Are Read To	0.53	0.44	0.0959	0.56	0.60	-0.04
If Read To, % by Parent	0.15	0.17	-0.013	0.14	0.18	-0.04
If Listens to Radio, % with Parent	0.41	0.39	0.0196	0.34	0.48	-0.13*
If Watches TV, % with Parent	0.18	0.18	0.0028	0.20	0.25	-0.06

** p<0.01, * p<0.05, + p<0.1

Table 23. Characteristics of 2nd and 3rd Grade Students (Students in Baseline and Midline)

	2nd Grade			3rd Grade		
	Bridge	Comparison	B - C	Bridge	Comparison	B - C
Count	93	69		93	76	
Demographics						
Mean Age	11.16	12.35	-1.194**	12.76	13.19	-0.434+
% Female	0.47	0.51	-0.0341	0.54	0.58	-0.0413
Education History						
% Attended School Last Year	0.89	0.94	-0.0496	0.93	0.88	0.0432
% Attended Any ECE	0.98	1.00	-0.0215	0.96	0.99	-0.0299
Years of ECE	2.56	2.73	-0.165	2.48	2.72	-0.240*
% Attended Beginner	0.88	0.88	-0.00234	0.81	0.88	-0.0751
% Attended Nursery	0.81	0.90	-0.0921	0.82	0.90	-0.0775
% Attended Kindergarten	0.87	0.94	-0.0711	0.87	0.95	-0.0872+
Meals						
% With No Meals	0.00	0.00	0	0.02	0.00	0.0215
Average # of Meals	2.43	2.23	0.208+	2.10	2.36	-0.258
% Who Had Breakfast	0.78	0.65	0.13+	0.60	0.63	-0.0288
% Who Had Lunch	0.97	0.97	-0.00362	0.91	0.97	-0.0586
% Who Had Dinner	0.69	0.61	0.0836	0.59	0.76	-0.176*
Assets						
% Has Radio	0.71	0.75	-0.0439	0.72	0.71	0.0138
% Has Television	0.26	0.24	0.0228	0.28	0.28	-0.00043
% Has Electricity	0.32	0.23	0.0868	0.32	0.21	0.109
% Has Cellphone	0.88	0.91	-0.0313	0.89	0.91	-0.0142
Language Exposure						
% Speak English at Home	0.70	0.62	0.0757	0.67	0.72	-0.057
% Listens To Radio	0.62	0.59	0.0295	0.53	0.61	-0.0865
% Watches TV	0.55	0.52	0.0266	0.47	0.53	-0.0602
Parent Involvement						
% Receive Homework Help	0.65	0.81	-0.166*	0.74	0.85	-0.111+
If Given Help, % by Parent	0.31	0.19	0.123+	0.15	0.26	-0.113+
% Reads Out Loud with Parent	0.48	0.53	-0.0459	0.53	0.60	-0.0667
% Are Read To	0.52	0.51	0.0145	0.51	0.63	-0.116
If Read To, % by Parent	0.16	0.20	-0.0416	0.12	0.20	-0.0791
If Listens to Radio, % with Parent	0.43	0.39	0.0388	0.36	0.51	-0.158*
If Watches TV, % with Parent	0.18	0.19	-0.00561	0.18	0.21	-0.0277

** p<0.01, * p<0.05, + p<0.1

A5. Baseline EGRA/EGMA Results

Estimates of differences between the treatment and control group are calculated as differences in means, while statistical significance is calculated through regression analysis.

Table 24. EGRA Average Results (All Baseline Students)

		Accuracy (% Correct)			Fluency (# Correct/Min)		
Grade	**EGRA Subtask**	**Bridge**	**Comparison**	**B - C**	**Bridge**	**Comparison**	**B - C**
Kindergarten	Letter Sound	0.3%	0.2%	0.1%	0.3	0.2	0.1
	Onset Sound	16.3%	16.8%	-0.6%	-	-	-
	Non-word Reading	0.0%	0.1%	-0.1%	0.0	0.1	-0.1
	Familiar Word Reading	1.1%	1.5%	-0.3%	0.6	0.7	-0.2
1st Grade	Letter Sound	0.9%	1.5%	-0.6%	0.9	1.5	-0.6
	Onset Sound	24.6%	21.5%	3.1%	-	-	-
	Non-word Reading	0.1%	0.2%	-0.1%	0.0	0.1	0.0
	Familiar Word Reading	5.3%	4.2%	1.2%	2.7	2.1	0.6
	Passage Fluency	3.2%	2.5%	0.7%	2.0	1.6	0.4
	Reading Comprehension	0.6%	0.9%	-0.3%	-	-	-
2nd Grade	Letter Sound	3.2%	5.4%	-2.3%	3.2	5.4	-2.3
	Onset Sound	29.6%	30.9%	-1.2%	-	-	-
	Non-word Reading	0.9%	1.1%	-0.1%	0.5	0.5	-0.1
	Familiar Word Reading	12.1%	12.6%	-0.5%	6.0	6.3	-0.3
	Passage Fluency	9.6%	5.6%	4.1%**	5.9	3.4	2.5**
	Reading Comprehension	2.5%	0.6%	1.9%*	-	-	-
3rd Grade	Non-word Reading	0.9%	0.9%	0.0%	0.5	0.5	0.0
	Familiar Word Reading	16.8%	19.1%	-2.3%	8.4	9.7	-1.3
	Passage Fluency	13.5%	17.0%	-3.5%	8.3	10.6	-2.4
	Reading Comprehension	5.3%	6.1%	-0.8%	-	-	-

** p<0.01, * p<0.05, + p<0.1

Table 25. EGRA Average Results (Students in Baseline & Midline)

		Accuracy (% Correct)			Fluency (# Correct/Min)		
Grade	**EGRA Subtask**	**Bridge**	**Comparison**	**B - C**	**Bridge**	**Comparison**	**B - C**
Kindergarten	Letter Sound	0.4%	0.2%	0.3%	0.4	0.2	0.3
	Onset Sound	16.8%	17.5%	-0.7%	-	-	-
	Non-word Reading	0.0%	0.2%	-0.2%	0.0	0.1	-0.1
	Familiar Word Reading	1.2%	1.6%	-0.4%	0.6	0.8	-0.2
1st Grade	Letter Sound	1.0%	1.7%	-0.6%	1.0	1.7	-0.6
	Onset Sound	24.2%	21.0%	3.1%	-	-	-
	Non-word Reading	0.1%	0.2%	-0.1%	0.0	0.1	-0.1
	Familiar Word Reading	5.4%	4.2%	1.2%	2.7	2.1	0.6
	Passage Fluency	3.4%	2.1%	1.3%+	2.1	1.3	0.8+
	Reading Comprehension	0.8%	1.0%	-0.3%	-	-	-
2nd Grade	Letter Sound	3.3%	5.4%	-2.1%	3.3	5.4	-2.1
	Onset Sound	29.0%	29.7%	-0.7%	-	-	-
	Non-word Reading	1.0%	1.0%	0.0%	0.5	0.5	0.0
	Familiar Word Reading	12.8%	12.2%	0.6%	6.4	6.2	0.2
	Passage Fluency	10.3%	5.7%	4.6%**	6.3	3.5	2.8**
	Reading Comprehension	2.6%	0.9%	1.7%+	-	-	-
3rd Grade	Non-word Reading	1.0%	0.7%	0.4%	0.5	0.3	0.2
	Familiar Word Reading	18.2%	18.0%	0.2%	9.1	9.1	0.0
	Passage Fluency	14.7%	15.7%	-0.9%	9.1	9.7	-0.6
	Reading Comprehension	5.6%	5.0%	0.6%	-	-	-

** p<0.01, * p<0.05, + p<0.1

Table 26. EGMA Average Results (All Baseline Students)

		Accuracy (% Correct)			Fluency (# Correct/Min)		
Grade	**EGRA Subtask**	**Bridge**	**Comparison**	**B - C**	**Bridge**	**Comparison**	**B - C**
Kindergarten	Number Identification	19.3%	33.6%	-14.3%**	4.1	9.3	-5.2**
	Quantity Discrimination	14.0%	22.9%	-8.9%**	-	-	-
	Addition 1	4.6%	14.8%	-10.1%**	0.9	3.0	-2.1**
	One-to-One Correspondence	36.0	46.5	-10.5*	-	-	-
1st Grade	Number Identification	47.1%	54.0%	-6.9%+	12.4	12.9	-0.5
	Quantity Discrimination	38.5%	43.4%	-4.9%	-	-	-
	Addition 1	18.2%	22.9%	-4.8%*	3.6	4.7	-1.0*
	Subtraction 1	11.7%	16.9%	-5.2%*	2.3	3.4	-1.0*
	Word Problems	31.8%	37.1%	-5.3%	-	-	-
2nd Grade	Quantity Discrimination	53.4%	57.4%	-4.1%	-	-	-
	Addition 1	30.5%	34.6%	-4.1%	6.6	7.0	-0.4
	Addition 2	32.8%	35.7%	-3.0%	-	-	-
	Subtraction 1	21.5%	27.7%	-6.2%*	4.3	5.5	-1.2*
	Subtraction 2	18.9%	24.0%	-5.1%	-	-	-
	Word Problems	48.5%	48.5%	0.0%	-	-	-
3rd Grade	Addition 1	37.3%	37.8%	-0.5%	7.5	7.6	-0.1
	Addition 2	41.2%	41.2%	0.0%	-	-	-
	Subtraction 1	29.4%	33.4%	-4.0%	6.2	6.7	-0.5
	Subtraction 2	30.5%	30.0%	0.5%	-	-	-
	Word Problems	51.1%	54.5%	-3.3%	-	-	-

** p<0.01, * p<0.05, + p<0.1

Table 27. EGMA Average Results (Students in Baseline & Midline)

		Accuracy (% Correct)			Fluency (# Correct/Min)		
Grade	**EGRA Subtask**	**Bridge**	**Comparison**	**B - C**	**Bridge**	**Comparison**	**B - C**
Kindergarten	Number Identification	19.9%	35.8%	-15.9%**	4.3	10.3	-6.0**
	Quantity Discrimination	14.6%	24.6%	-9.9%**	-	-	-
	Addition 1	5.1%	14.6%	-9.5%**	1.0	2.9	-1.9**
	One-to-One Correspondence	38.8	47.8	-9.0+	-	-	-
1st Grade	Number Identification	48.5%	55.2%	-6.7%	13.5	13.2	0.3
	Quantity Discrimination	41.1%	44.5%	-3.3%	-	-	-
	Addition 1	19.1%	24.3%	-5.2%+	3.8	4.9	-1.1*
	Subtraction 1	12.5%	18.0%	-5.5%*	2.5	3.6	-1.1*
	Word Problems	32.2%	36.0%	-3.9%	-	-	-
2nd Grade	Quantity Discrimination	54.3%	54.9%	-0.6%	-	-	-
	Addition 1	30.4%	31.8%	-1.4%	6.4	6.4	0.1
	Addition 2	32.4%	34.8%	-2.4%	-	-	-
	Subtraction 1	21.3%	27.4%	-6.1%	4.3	5.5	-1.2
	Subtraction 2	18.5%	24.3%	-5.9%	-	-	-
	Word Problems	48.4%	49.0%	-0.6%	-	-	-
3rd Grade	Addition 1	38.5%	39.1%	-0.5%	7.8	7.9	-0.1
	Addition 2	44.1%	40.8%	3.3%	-	-	-
	Subtraction 1	31.3%	34.5%	-3.2%	6.6	6.9	-0.3
	Subtraction 2	33.5%	28.9%	4.5%	-	-	-
	Word Problems	54.4%	53.9%	-0.5%	-	-	-

** p<0.01, * p<0.05, + p<0.1

A6. School Survey Details

Table 28. School Characteristics from In-Person Visits

	Bomi		Bong		Grand Cape		Margibi		Montserrado		Nimba	
	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control
Accessibilty												
Minutes Walk from Main Road	1	140	1	1	3	3	2	1	3	1	15	10
Accessible by Foot During Heavy Rain	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Accessible by Motorbike and Car	Both	Not Car	Both	Both	Both	Both	Both	Both	Both	Both	Both	Both
Infrastructure & Assets												
Has Electritiy	No	No	No	No	No	No	No	No	No	No	No	No
Number of Classrooms	6	12	10	13	8	8	5	5	8	9	7	11
Number of Classrooms in Active Use	6	12	10	14	8	7	5	5	8	9	7	11
Number of Bathrooms	4	4	10	8	4	4	8	4	6	8	8	14
Number of Bathrooms in Active Use	4	4	2	4	2	4	4	4	5	5	4	12
Has a Library	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes
Has Access to Water	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School Staff												
Principal Gender	M	M	M	M	M	M	M	F	M	M	M	M
Years of Experience as Principal	2	32	0.5	20	1	13	0.5	0.5	1	8	4	26
Principal Education Level	Certificate AA	Certificate AA	Sr. High	Certificate C	Associate	Associate	Associate	Associate	Certificate C	Certificate AA	Associate	Associate
# of Primary Teachers	9	9	9	9	8	9	5	8	7	9	7	9
% Teachers Female	22%	33%	11%	56%	25%	44%	20%	50%	29%	44%	29%	22%
# of ECE Grade Levels Offered	3	3	3	3	1	3	0	2	1	3	1	3
# of Primary Grade Levels Offered	6	6	6	6	6	6	5	6	6	6	6	6
Additional Features												
Length of School Day (hrs)	8.0	6.0	8.0	4.5	7.6	5.8	8.0	4.8	8.0	5.4	8.0	5.5
Has Free Lunch Program	Yes	Yes	No	No	Yes	Yes	No	No	No	No	No	Yes
Had a PTA Meeting in 1st Semester	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes

Table 29. Classroom Details from In-Person Visits

	Bomi		Bong		Grand Cape		Margibi		Montserrado		Nimba	
	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control	Bridge	Control
Offers Beginner Class	Yes	Yes	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	-	Yes	-	-	-	Yes	-	Yes
# of students enrollled	67	35	47	57	-	142	-	-	-	42	-	88
# of students present	20	28	40	35	-	87	-	-	-	32	-	54
% of students present	30%	80%	85%	61%	-	61%	-	-	-	76%	-	61%
Offers Nursery Class	Yes	Yes	Yes	Yes	No	Yes*	No	Yes	No	Yes*	No	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	-	-	-	No	-	-	-	No
# of students enrollled	29	14	57	24	-	-	-	8	-	-	-	52
# of students present	15	9	39	20	-	-	-	4	-	-	-	34
% of students present	52%	64%	68%	83%	-	-	-	50%	-	-	-	65%
Offers Kindergarten	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes	No
# of students enrollled	11	18	57	15	82	44	-	12	54	36	60	41
# of students present	9	14	33	16	47	28	-	14	47	31	51	28
% of students present	82%	78%	58%	107%	57%	64%	-	117%	87%	86%	85%	68%
Offers 1st Grade	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	No	Yes	Yes	Yes	Yes	-	No	Yes	Yes	Yes	No
# of students enrollled	47	29	61	62	72	63	-	14	52	23	59	42
# of students present	34	17	49	48	31	39	-	12	39	30	44	33
% of students present	72%	59%	80%	77%	43%	62%	-	86%	75%	130%	75%	79%
Offers 2nd Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	No
# of students enrollled	17	12	59	52	50	55	53	14	53	26	48	21
# of students present	11	7	47	26	21	38	29	12	32	23	30	16
% of students present	65%	58%	80%	50%	42%	69%	55%	86%	60%	88%	63%	76%
Offers 3rd Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes	No
# of students enrollled	21	11	54	42	53	36	48	16	51	35	46	29
# of students present	17	9	42	30	30	23	14	8	36	35	34	18
% of students present	81%	82%	78%	71%	57%	64%	29%	50%	71%	100%	74%	62%
Offers 4th Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
# of students enrollled	25	18	49	59	43	35	30	17	48	27	20	21
# of students present	17	18	34	39	21	34	9	0	30	26	12	16
% of students present	68%	100%	69%	66%	49%	97%	30%	0%	63%	96%	60%	76%
Offers 5th Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	No
# of students enrollled	11	10	41	34	38	14	21	15	51	26	22	16
# of students present	10	5	31	28	13	17	4	0	29	27	8	9
% of students present	91%	50%	76%	82%	34%	121%	19%	0%	57%	104%	36%	56%
Offers 6th Grade	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teacher or Substitute Present	Yes	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No
# of students enrollled	25	16	46	35	46	26	32	11	43	33	45	18
# of students present	18	9	34	25	9	17	8	0	24	18	18	11
% of students present	72%	56%	74%	71%	20%	65%	25%	0%	56%	55%	40%	61%

Note: Two of the control schools have combined Beginner and Nursery classes (Grand Cape Mount and Montserrado counties).

A7. School Selection - Principal Component Analysis

The external evaluation team used the following variables from the Ministry of Education's EMIS dataset to determine appropriate control schools for each of the Bridge PSL public schools in our study. Bridge does not currently have access to this information by school. We have made a formal request for the data and plan to include it in following reports should the request be approved.

Variables Analyzed:

- Teachers per student
- Classrooms per student
- Chairs per student
- Desks per student
- Benches per student
- Chalkboards per student
- Books per student
- A dummy for "solid building"
- A dummy for "piped water"
- A dummy for "well"
- A dummy for "toilet"
- A dummy for "staff room"
- A dummy for generator
- Number of students

A8. Standardization of Scores

To standardize the raw subtask scores in our study, we first calculated the means and standard deviations from our baseline sample of students. We included all baseline scores in this calculation, regardless of whether the student attrited or not.

After calculating the baseline means and standard deviations, we used those numbers to standardize both the baseline and midline results by student using the following formula:

$$\text{Standardized Score} = \frac{student's\ raw\ score\ (subtask\ 1) - \ baseline\ mean\ (subtask\ 1)}{baseline\ standard\ deviation\ (subtask\ 1)}$$

The table below lists the means and standard deviations calculated by sub-task.

Table 30. Baseline Means and Standard Deviations

	Subtask	Baseline Mean	Baseline Standard Deviation
EGRA	Letter Sounds	1.87	6.45
	Onset Sounds	0.23	0.23
	Non-word Reading	0.27	1.19
	Familiar Word Reading	4.59	6.82
	Passage Fluency	5.31	8.64
	Reading Comprehension	0.03	0.08
EGMA	One to One Counting	42.44	32.77
	Number Identification	10.07	17.49
	Quantity Discrimination	0.39	0.31
	Addition 1	5.18	4.43
	Addition 2	0.38	0.29
	Subtraction 1	4.73	4.13
	Subtraction 2	0.26	0.26
	Word Problems	0.45	0.26

A9. Differential Attrition – Probit Regressions

We ran three different specifications to balance between including all baseline information and losing power due to too many interaction effects. Each specification was run for all subtasks.

(1) Simple probit regression with no interaction effects:

$$attrite = \beta_0 + \beta_1(Bridge) + \beta_2(grade\ 1) + \beta_3(grade\ 2) + \beta_4(grade\ 3) + \beta_5(baseline\ subtask\ score) + \varepsilon$$

(2) Expanded probit regression with interaction effects on grade and baseline score:

$$attrite = \beta_0 + \beta_1(Bridge) + \beta_2(grade\ 1) + \beta_3(grade\ 2) + \beta_4(grade\ 3) + \beta_5(grade\ 1{*}Bridge) + \beta_6(grade\ 2{*}Bridge) + \beta_7(grade\ 3{*}Bridge) + \beta_8(baseline\ subtask\ score) + \beta_7(baseline\ subtask\ score{*}Bridge) + \varepsilon$$

(3) Comprehensive probit regression including items in (1) & (2) and adding all collected demographic characteristics and interactions:

$$attrite = \beta_0 + \beta_1(Bridge) + \beta_2(grade\ 1) + \beta_3(grade\ 2) + \beta_4(grade\ 3) + \beta_5(grade\ 1{*}Bridge) + \beta_6(grade\ 2{*}Bridge) + \beta_7(grade\ 3{*}Bridge) + \beta_8(baseline\ subtask\ score) + \beta_7(baseline\ subtask\ score{*}Bridge) + \beta_8(baseline\ characteristics) + \beta_9(baseline\ characteristics{*}Bridge) + \varepsilon$$

The findings from the models are consistent and we gain the most insight into differential attrition from model 3. In addition to the key findings discussed in the body of the paper, we found a few other interesting differences in attrition connected to demographics.

We found that students in early grades at Bridge who read at home with a family member are less likely to attrite. Interestingly, this trend flips for older students. 2nd and 3rd graders who read at home were more likely to attrite at Bridge. We also found that students who read or did homework with their parents were less likely to attrite, but this is only for students in the higher grades.

Generally, early grade students in the study who went to school last year were less likely to attrite. However, we saw the opposite effect for early grade students at Bridge. It's possible that the length of the Bridge school day is associated with younger students dropping out. This warrants further investigation.

Table 31. Probit Regressions (Model 1)

	KG	KG & G1	KG-G2	KG-G2	KG-G2	KG-G3	KG-G3	KG-G3	G1-G3	G1-G3	G1-G3	G1-G3	G2 & G3	G2 & G3
	One to One Counting	**Number Id.**	**Quantity Disc.**	**Letter Sounds**	**Onset Sounds**	**Non-word Reading**	**Familiar Word Reading**	**Addition 1**	**Passage Fluency**	**Reading Comp.**	**Subtraction 1**	**Word Problems**	**Addition 2**	**Subtraction 2**
Bridge	0.145	0.104	-0.0337	-0.0226	-0.0197	-0.0572	-0.0539	-0.0578	-0.134	-0.133	-0.163	-0.134	-0.274	-0.251
	(0.184)	(0.125)	(0.104)	(0.0988)	(0.0973)	(0.110)	(0.109)	(0.112)	(0.134)	(0.135)	(0.137)	(0.137)	(0.184)	(0.184)
Student in Grade 1		-0.142	-0.171	-0.223+	-0.238*	-0.225+	-0.217+	-0.220+						
		(0.125)	(0.120)	(0.116)	(0.120)	(0.119)	(0.119)	(0.124)						
Student in Grade 2			-0.0595	-0.166	-0.204	-0.181	-0.155	-0.125	0.0586	0.0517	0.143	0.0939		
			(0.138)	(0.141)	(0.139)	(0.130)	(0.142)	(0.146)	(0.120)	(0.117)	(0.138)	(0.130)		
Student in Grade 3						-0.104	-0.0773	-0.0547	0.137	0.118	0.253	0.167	0.0876	0.0760
						(0.182)	(0.196)	(0.209)	(0.182)	(0.173)	(0.204)	(0.193)	(0.180)	(0.185)
Baseline Task Score	-0.138+	-0.372*	-0.102+	-0.0248	0.0351	0.00996	-0.0286	-0.0515	-0.0224	-0.000398	-0.146*	-0.0553	-0.0395	-0.0553
	(0.0729)	(0.179)	(0.0607)	(0.0470)	(0.0640)	(0.0346)	(0.0647)	(0.0702)	(0.0704)	(0.0541)	(0.0742)	(0.0569)	(0.0755)	(0.0787)
Constant	-0.702**	-0.762**	-0.689**	-0.634**	-0.618**	-0.612**	-0.632**	-0.645**	-0.813**	-0.804**	-0.876**	-0.840**	-0.699**	-0.703**
	(0.146)	(0.127)	(0.116)	(0.111)	(0.112)	(0.112)	(0.120)	(0.119)	(0.106)	(0.0996)	(0.114)	(0.111)	(0.131)	(0.134)
Count	206	422	626	627	627	846	845	843	639	639	638	638	420	420

*Standard errors in parentheses; + p<0.10, * p<0.05, ** p<0.01*

Table 32. Probit Regressions (Model 2)

	KG **One to One Counting**	KG & G1 **Number Id.**	KG-G2 **Quantity Disc.**	KG-G2 **Letter Sounds**	KG-G2 **Onset Sounds**	KG-G3 **Non-word Reading**	KG-G3 **Familiar Word Reading**	KG-G3 **Addition 1**	G1-G3 **Passage Fluency**	G1-G3 **Reading Comp.**	G1-G3 **Subtraction 1**	G1-G3 **Word Problems**	G2 & G3 **Addition 2**	G2 & G3 **Subtraction 2**
Bridge	0.132	0.0969	0.0685	0.141	0.191	0.161	0.0266	0.125	-0.0401	0.0906	0.0930	0.0586	-0.449**	-0.439**
	(0.182)	(0.218)	(0.181)	(0.166)	(0.167)	(0.161)	(0.177)	(0.203)	(0.151)	(0.138)	(0.178)	(0.174)	(0.154)	(0.154)
Student in Grade 1		-0.140	-0.211	-0.208	-0.218	-0.212	-0.227	-0.238						
		(0.186)	(0.170)	(0.169)	(0.170)	(0.169)	(0.170)	(0.181)						
Student in Grade 2			0.135	0.0977	0.0682	0.0643	0.0234	0.0982	0.277+	0.300+	0.399*	0.305+		
			(0.196)	(0.208)	(0.187)	(0.186)	(0.199)	(0.211)	(0.153)	(0.155)	(0.200)	(0.178)		
Student in Grade 3						0.0324	-0.0741	0.0422	0.117	0.190	0.373	0.235	-0.0669	-0.0909
						(0.293)	(0.301)	(0.302)	(0.282)	(0.269)	(0.310)	(0.293)	(0.289)	(0.296)
Grade 1 * Bridge		-0.0000871	0.0617	-0.0480	-0.0707	-0.0604	0.0103	0.00265						
		(0.249)	(0.220)	(0.209)	(0.224)	(0.209)	(0.211)	(0.228)						
Grade 2 * Bridge			-0.415+	-0.513*	-0.584*	-0.531*	-0.375	-0.503+	-0.388+	-0.503*	-0.532*	-0.431+		
			(0.250)	(0.256)	(0.244)	(0.220)	(0.258)	(0.270)	(0.219)	(0.201)	(0.248)	(0.238)		
Grade 3 * Bridge						-0.305	-0.0214	-0.242	0.0322	-0.182	-0.251	-0.163	0.318	0.346
						(0.347)	(0.390)	(0.420)	(0.370)	(0.335)	(0.395)	(0.367)	(0.348)	(0.357)
Baseline Task Score	-0.102	-0.355	-0.0405	-0.0127	0.0293	0.0539	0.0759	-0.0179	0.114*	0.0727	-0.128	0.0522	0.0537	0.0386
	(0.117)	(0.235)	(0.0925)	(0.0371)	(0.0896)	(0.0373)	(0.0578)	(0.0882)	(0.0475)	(0.0708)	(0.0996)	(0.0716)	(0.0939)	(0.103)
Baseline Task Score * Bridge	-0.0935	-0.0515	-0.134	-0.188	0.00683	-0.133+	-0.276*	-0.0502	-0.407**	-0.136	-0.0422	-0.193+	-0.192	-0.193
	(0.118)	(0.351)	(0.117)	(0.168)	(0.128)	(0.0735)	(0.118)	(0.151)	(0.151)	(0.0877)	(0.150)	(0.108)	(0.145)	(0.151)
Constant	-0.704**	-0.762**	-0.734**	-0.716**	-0.704**	-0.703**	-0.669**	-0.715**	-0.877**	-0.906**	-1.000**	-0.936**	-0.622**	-0.622**
	(0.149)	(0.149)	(0.136)	(0.142)	(0.140)	(0.141)	(0.144)	(0.143)	(0.0947)	(0.0956)	(0.121)	(0.116)	(0.127)	(0.127)
Count	206	422	626	627	627	846	845	843	639	639	638	638	420	420

*Standard errors in parentheses; + p<0.10, * p<0.05, ** p<0.01*

Table 33. Probit Regressions (Model 3)

	KG **One to One Counting**	KG & G1 **Number Id.**	KG-G2 **Quantity Disc.**	KG-G2 **Letter Sounds**	KG-G2 **Onset Sounds**	KG-G3 **Non-word Reading**	KG-G3 **Familiar Word Reading**	KG-G3 **Addition 1**	G1-G3 **Passage Fluency**	G1-G3 **Reading Comp.**	G1-G3 **Subtraction 1**	G1-G3 **Word Problems**	G2 & G3 **Addition 2**	G2 & G3 **Subtraction 2**
Bridge	-1.227	-0.905	-0.915	-0.479	-0.456	-0.0280	-0.235	-0.177	-0.293	-0.287	-0.451	-0.481	0.409	-0.202
	(0.978)	(0.891)	(0.661)	(0.708)	(0.685)	(0.657)	(0.690)	(0.701)	(1.050)	(1.019)	(1.045)	(1.078)	(1.476)	(1.413)
Student in Grade 1		0.186	0.0494	0.0544	0.0306	0.0457	0.0141	0.0441						
		(0.379)	(0.318)	(0.325)	(0.329)	(0.287)	(0.286)	(0.279)						
Student in Grade 2			0.439	0.447	0.403	0.391	0.319	0.411	0.345	0.376	0.413+	0.341		
			(0.287)	(0.300)	(0.291)	(0.258)	(0.261)	(0.256)	(0.226)	(0.233)	(0.241)	(0.236)		
Student in Grade 3						0.330	0.198	0.345	0.202	0.306	0.427	0.286	0.00424	0.00900
						(0.360)	(0.376)	(0.359)	(0.322)	(0.306)	(0.311)	(0.301)	(0.299)	(0.304)
Grade 1 * Bridge		-0.527	-0.389	-0.465	-0.450	-0.248	-0.180	-0.218						
		(0.440)	(0.366)	(0.364)	(0.372)	(0.334)	(0.336)	(0.329)						
Grade 2 * Bridge			-0.808*	-0.933**	-0.914*	-0.691*	-0.495	-0.641*	-0.303	-0.482+	-0.443	-0.366		
			(0.358)	(0.359)	(0.358)	(0.320)	(0.333)	(0.320)	(0.279)	(0.276)	(0.286)	(0.287)		
Grade 3 * Bridge						-0.620	-0.297	-0.567	-0.0812	-0.417	-0.422	-0.351	0.0915	0.0660
						(0.482)	(0.502)	(0.505)	(0.399)	(0.390)	(0.406)	(0.381)	(0.402)	(0.413)
Baseline Task Score	-0.0185	-0.212	0.00955	0.00376	0.0657	0.0747+	0.110+	0.0116	0.147*	0.0775	-0.0984	0.114	0.0898	0.0505
	(0.0851)	(0.243)	(0.0932)	(0.0305)	(0.0920)	(0.0387)	(0.0653)	(0.0778)	(0.0591)	(0.0656)	(0.0930)	(0.0731)	(0.103)	(0.115)
Baseline Task Score * Bridge	-0.231	-0.434	-0.233+	-0.0577	-0.0393	-0.153*	-0.381**	-0.108	-0.584**	-0.119	-0.0856	-0.296*	-0.233	-0.175
	(0.163)	(0.446)	(0.136)	(0.155)	(0.127)	(0.0780)	(0.120)	(0.151)	(0.160)	(0.0884)	(0.159)	(0.125)	(0.142)	(0.160)
Age	0.0220	0.00566	0.000240	-0.0000392	-0.000105	0.00978	0.0123	0.00910	0.00124	-0.00446	-0.00501	-0.00216	0.0219	-0.000786
	(0.0166)	(0.0217)	(0.0252)	(0.0251)	(0.0263)	(0.0222)	(0.0227)	(0.0222)	(0.0398)	(0.0384)	(0.0380)	(0.0386)	(0.0616)	(0.0599)
Age * Bridge	0.0861	0.00745	0.0198	-0.00260	-0.00424	-0.00616	-0.00865	0.00293	-0.0127	0.0000552	0.00627	0.0112	-0.0460	-0.0180
	(0.157)	(0.0827)	(0.0587)	(0.0622)	(0.0615)	(0.0492)	(0.0491)	(0.0499)	(0.0580)	(0.0577)	(0.0577)	(0.0576)	(0.0739)	(0.0718)
Female	-0.219	0.00594	-0.174	-0.177	-0.174	-0.0288	-0.0180	-0.0386	0.0535	0.0299	0.00185	0.0827	-0.176	-0.221
	(0.306)	(0.226)	(0.162)	(0.169)	(0.169)	(0.140)	(0.144)	(0.135)	(0.167)	(0.167)	(0.180)	(0.179)	(0.189)	(0.185)
Female * Bridge	-0.662	-0.181	-0.228	-0.178	-0.175	-0.161	-0.193	-0.168	-0.165	-0.0888	-0.0954	-0.170	-0.200	-0.152
	(0.528)	(0.355)	(0.266)	(0.269)	(0.272)	(0.231)	(0.232)	(0.221)	(0.261)	(0.259)	(0.266)	(0.263)	(0.310)	(0.315)
Attended School Last Year	0.0185	-0.259	-0.558**	-0.558**	-0.560**	-0.280	-0.299	-0.264	-0.410	-0.395	-0.322	-0.384	-0.396	-0.455
	(0.122)	(0.210)	(0.207)	(0.198)	(0.203)	(0.195)	(0.191)	(0.194)	(0.255)	(0.246)	(0.259)	(0.248)	(0.371)	(0.377)
Attended Last Year * Bridge	0.807+	0.817*	1.001*	1.039**	1.069**	0.426	0.421	0.413	0.259	0.259	0.185	0.192	0.0904	0.229
	(0.412)	(0.383)	(0.411)	(0.387)	(0.403)	(0.366)	(0.374)	(0.373)	(0.456)	(0.434)	(0.446)	(0.451)	(0.616)	(0.613)
Has Electricity	0.135	0.247	0.133	0.134	0.138	0.230	0.244	0.222	0.351	0.304	0.269	0.292	0.213	0.154
	(0.404)	(0.304)	(0.245)	(0.247)	(0.242)	(0.200)	(0.205)	(0.199)	(0.253)	(0.249)	(0.259)	(0.248)	(0.280)	(0.259)
Has Electricity * Bridge	0.0125	-0.285	-0.0110	0.0248	0.0130	-0.266	-0.285	-0.250	-0.428	-0.349	-0.342	-0.354	-0.145	-0.127
	(0.523)	(0.371)	(0.333)	(0.329)	(0.327)	(0.284)	(0.296)	(0.283)	(0.354)	(0.334)	(0.350)	(0.341)	(0.419)	(0.394)
Years of ECE	-0.389	-0.351	-0.243	-0.243	-0.238	-0.229	-0.223	-0.235+	-0.143	-0.178	-0.200	-0.194	-0.127	-0.124
	(0.318)	(0.218)	(0.179)	(0.178)	(0.184)	(0.143)	(0.141)	(0.141)	(0.171)	(0.167)	(0.169)	(0.178)	(0.228)	(0.212)
Years of ECE * Bridge	0.518	0.535+	0.386+	0.348+	0.337	0.164	0.195	0.171	0.112	0.111	0.164	0.151	-0.0720	-0.0960
	(0.372)	(0.277)	(0.213)	(0.209)	(0.211)	(0.165)	(0.164)	(0.165)	(0.194)	(0.189)	(0.189)	(0.200)	(0.243)	(0.225)
Meals	0.0817	-0.0371	-0.0199	-0.0199	-0.0132	-0.0679	-0.0696	-0.0716	-0.161	-0.166+	-0.174+	-0.176+	-0.188	-0.184
	(0.115)	(0.114)	(0.0812)	(0.0791)	(0.0841)	(0.0751)	(0.0771)	(0.0763)	(0.0993)	(0.0959)	(0.0970)	(0.0916)	(0.115)	(0.120)
Meals * Bridge	0.126	-0.181	-0.221	-0.225	-0.234+	-0.188	-0.189	-0.182	-0.199	-0.175	-0.170	-0.157	-0.132	-0.0904
	(0.164)	(0.195)	(0.140)	(0.140)	(0.140)	(0.114)	(0.116)	(0.115)	(0.133)	(0.131)	(0.132)	(0.128)	(0.163)	(0.167)
Reads Aloud at Home	0.235	0.400+	0.125	0.126	0.122	0.00634	0.0116	0.0143	-0.0988	-0.0748	-0.0860	-0.0810	-0.433**	-0.470**
	(0.242)	(0.214)	(0.202)	(0.202)	(0.208)	(0.159)	(0.158)	(0.154)	(0.181)	(0.181)	(0.179)	(0.182)	(0.139)	(0.141)
Reads Aloud at Home * Bridge	-1.096**	-0.973**	-0.333	-0.364	-0.367	-0.0180	-0.0670	-0.0386	0.136	0.177	0.179	0.200	0.940**	0.936**
	(0.367)	(0.332)	(0.287)	(0.280)	(0.280)	(0.251)	(0.247)	(0.249)	(0.279)	(0.283)	(0.277)	(0.284)	(0.293)	(0.261)
Asset Index	-0.816	-0.819	-0.459	-0.460	-0.488	-0.350	-0.368	-0.320	-0.217	-0.182	-0.0704	-0.136	0.178	0.0822
	(0.629)	(0.517)	(0.359)	(0.356)	(0.354)	(0.294)	(0.304)	(0.290)	(0.384)	(0.372)	(0.334)	(0.381)	(0.499)	(0.525)
Asset Index * Bridge	0.317	1.268	0.719	0.609	0.643	0.702	0.805	0.685	0.802	0.684	0.598	0.741	-0.129	0.103
	(1.077)	(0.827)	(0.564)	(0.556)	(0.552)	(0.484)	(0.508)	(0.488)	(0.601)	(0.581)	(0.560)	(0.611)	(0.780)	(0.803)
School Activity with Parent Index	0.262	-0.194	-0.240	-0.240	-0.242	-0.429+	-0.402+	-0.381+	-0.570*	-0.541*	-0.515*	-0.539*	-0.545*	-0.504+
	(0.411)	(0.295)	(0.268)	(0.277)	(0.276)	(0.237)	(0.230)	(0.223)	(0.261)	(0.262)	(0.254)	(0.260)	(0.267)	(0.282)
School Activity Index * Bridge	0.264	0.272	-0.197	-0.275	-0.282	0.360	0.407	0.285	0.533	0.385	0.352	0.408	0.448	0.384
	(0.582)	(0.510)	(0.425)	(0.429)	(0.430)	(0.344)	(0.339)	(0.335)	(0.407)	(0.407)	(0.381)	(0.392)	(0.434)	(0.453)
Other Activity with Parent Index	0.559	0.400	0.274	0.275	0.293	0.244	0.237	0.232	0.100	0.109	0.0645	0.125	0.150	0.184
	(0.809)	(0.484)	(0.390)	(0.383)	(0.382)	(0.310)	(0.317)	(0.313)	(0.356)	(0.358)	(0.344)	(0.354)	(0.433)	(0.431)
Other Activity Index * Bridge	-0.871	-0.618	-0.475	-0.518	-0.549	-0.520	-0.560	-0.496	-0.426	-0.390	-0.342	-0.447	-0.447	-0.532
	(0.994)	(0.567)	(0.491)	(0.480)	(0.478)	(0.380)	(0.394)	(0.384)	(0.443)	(0.435)	(0.418)	(0.445)	(0.529)	(0.500)
Speaks English at Home	0.0672	0.0129	0.0737	0.0749	0.0784	0.0654	0.0722	0.0657	0.0601	0.0592	0.0591	0.146	0.265	0.248
	(0.200)	(0.173)	(0.210)	(0.209)	(0.208)	(0.187)	(0.189)	(0.190)	(0.249)	(0.245)	(0.250)	(0.253)	(0.370)	(0.393)
Speaks English at Home * Bridge	-0.409	-0.438	-0.316	-0.327	-0.334	-0.213	-0.231	-0.197	-0.150	-0.129	-0.121	-0.236	-0.176	-0.151
	(0.519)	(0.370)	(0.335)	(0.341)	(0.338)	(0.273)	(0.277)	(0.270)	(0.336)	(0.325)	(0.333)	(0.332)	(0.435)	(0.454)
Constant	-0.362	0.131	0.324	0.323	0.327	0.00559	0.0357	-0.00165	0.257	0.361	0.304	0.282	0.176	0.594
	(0.449)	(0.504)	(0.459)	(0.455)	(0.466)	(0.428)	(0.428)	(0.433)	(0.749)	(0.739)	(0.731)	(0.764)	(1.219)	(1.151)
Count	169	374	572	572	572	783	783	782	614	614	614	614	407	407

*Standard errors in parentheses; + p<0.10, * p<0.05, ** p<0.01*

A10. Additional DiD Regressions

A10.1 Simplified DiD Regression – Specification & Results

As mentioned in the body of the paper, we ran two additional panel DiD models to compare Bridge PSL public and traditional school differences. The first additional model is a pared down version of the specification found in the paper. In this simplified model we only include the following information:

- **Grade Levels:** The child's grade level, to allow for differing levels of achievement across grades;
- **Baseline Assessment Scores:** The student's score at baseline on a particular subtask, along with its squared and cubed functions to allow for the possibility of non-linear effects;

This translates into the following model specification for our regression analysis:

$$\textit{midline subtask score} = \beta_0 + \beta_1(\textit{treatment}) + \beta_2(\textit{grade 1}) + \beta_3(\textit{grade 2}) + \beta_4(\textit{grade 3}) + \beta_5(\textit{baseline subtask score}) + \beta_6(\textit{baseline subtask score}^2) + \beta 7(\textit{baseline subtask score}^3) + \varepsilon$$

All of the results from this pared down model are consistent in statistical significance with the results stated in the paper. See Tables 34-37 for results.

Table 34. Simplified Model – Raw EGRA Results

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	10.84**	0.0205	0.750**	3.221**	6.129**	0.0554**
	(1.942)	(0.0311)	(0.210)	(0.790)	(1.383)	(0.0174)
Student in Grade 1	1.147	0.00317	0.516*	1.248		
	(1.908)	(0.0395)	(0.224)	(0.868)		
Student in Grade 2	2.094	0.101*	1.187**	2.275*	1.898	0.0522**
	(2.135)	(0.0416)	(0.253)	(1.075)	(1.273)	(0.0159)
Student in Grade 3			0.649*	1.979*	1.223	0.0753**
			(0.253)	(0.950)	(1.875)	(0.0231)
Baseline Task Score	1.822**	-0.122	2.458*	1.338**	1.900**	-0.0466
	(0.480)	(0.336)	(1.070)	(0.205)	(0.288)	(0.473)
Baseline Task Score ^2	-0.0298	0.964	-0.214	-0.00117	-0.0111	3.854
	(0.0325)	(1.313)	(0.332)	(0.0132)	(0.0180)	(2.406)
Baseline Task Score ^3	0.000291	-0.757	0.00750	-0.0000774	0.0000250	-3.042
	(0.000485)	(1.249)	(0.0214)	(0.000208)	(0.000292)	(2.370)
Constant	0.669	0.270**	-0.235*	0.772	-0.409	-0.00851
	(0.879)	(0.0311)	(0.114)	(0.539)	(0.813)	(0.00930)
Count	489	489	658	658	506	506
R-squared	0.485	0.088	0.299	0.659	0.618	0.290

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

Table 35. Simplified Model – Standardized EGRA Results

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	1.681**	0.0910	0.629**	0.472**	0.710**	0.653**
	(0.301)	(0.138)	(0.176)	(0.116)	(0.160)	(0.205)
Student in Grade 1	0.178	0.0140	0.433*	0.183		
	(0.296)	(0.175)	(0.188)	(0.127)		
Student in Grade 2	0.325	0.445*	0.995**	0.334*	0.220	0.614**
	(0.331)	(0.184)	(0.212)	(0.158)	(0.147)	(0.187)
Student in Grade 3			0.544*	0.290*	0.142	0.886**
			(0.212)	(0.139)	(0.217)	(0.271)
Baseline Task Score	1.713**	0.204+	2.345*	1.323**	1.784**	0.156
	(0.378)	(0.103)	(0.916)	(0.118)	(0.169)	(0.355)
Baseline Task Score ^2	-0.181	0.0987	-0.249	-0.0152	-0.0921	0.306
	(0.193)	(0.106)	(0.376)	(0.0717)	(0.118)	(0.188)
Baseline Task Score ^3	0.0121	-0.0385	0.0107	-0.00360	0.00186	-0.0220
	(0.0202)	(0.0636)	(0.0304)	(0.00966)	(0.0218)	(0.0171)
Constant	0.326	0.231	0.115	0.336**	0.470**	-0.403*
	(0.193)	(0.151)	(0.248)	(0.109)	(0.145)	(0.158)
Count	489	489	658	658	506	506
R-squared	0.485	0.088	0.299	0.659	0.618	0.290

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

Table 36. Simplified Model – Raw EGMA Results

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	-8.017	1.566	0.0129	2.158**	0.102*	2.073**	0.0871	0.0497+
	(4.887)	(0.973)	(0.0247)	(0.344)	(0.0402)	(0.340)	(0.0508)	(0.0259)
Student in Grade 1		1.344	0.0263	1.090*				
		(0.822)	(0.0306)	(0.478)				
Student in Grade 2			0.109**	2.292**		0.893+		0.0915*
			(0.0331)	(0.567)		(0.488)		(0.0353)
Student in Grade 3				3.252**	0.0510	1.423**	0.000597	0.0866**
				(0.508)	(0.0427)	(0.450)	(0.0537)	(0.0283)
Baseline Task Score	0.570	1.061**	1.500**	0.837**	0.802+	0.956**	1.798**	0.393
	(0.915)	(0.0845)	(0.265)	(0.216)	(0.389)	(0.212)	(0.289)	(0.262)
Baseline Task Score ^2	-0.00275	-0.00932**	-1.110+	-0.00230	-1.051	-0.0286	-4.366**	0.319
	(0.0206)	(0.00114)	(0.642)	(0.0221)	(0.852)	(0.0245)	(0.707)	(0.620)
Baseline Task Score ^3	0.00000244	0.0000210**	0.357	-0.000468	0.566	0.000184	3.003**	-0.326
	(0.000131)	(0.00000440)	(0.417)	(0.000439)	(0.538)	(0.000460)	(0.506)	(0.428)
Constant	40.04**	4.110**	0.110**	1.566**	0.255**	1.736**	0.198**	0.229**
	(11.27)	(0.874)	(0.0271)	(0.390)	(0.0531)	(0.403)	(0.0529)	(0.0351)
Count	152	327	489	657	330	506	330	506
R-squared	0.113	0.528	0.616	0.544	0.142	0.441	0.123	0.286

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*

Table 37. Simplified Model – Standardized EGMA Results

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	-0.245	0.0896	0.0417	0.487**	0.348*	0.502**	0.331	0.191+
	(0.149)	(0.0557)	(0.0801)	(0.0777)	(0.137)	(0.0824)	(0.193)	(0.0997)
Student in Grade 1		0.0769	0.0852	0.246*				
		(0.0470)	(0.0991)	(0.108)				
Student in Grade 2			0.353**	0.517**		0.216+		0.353*
			(0.107)	(0.128)		(0.118)		(0.136)
Student in Grade 3				0.734**	0.174	0.344**	0.00227	0.334**
				(0.115)	(0.146)	(0.109)	(0.205)	(0.109)
Baseline Task Score	0.350+	0.879**	0.802**	0.775**	0.249**	0.698**	0.141	0.481**
	(0.191)	(0.0818)	(0.0859)	(0.0546)	(0.0882)	(0.0581)	(0.0889)	(0.0811)
Baseline Task Score ^2	-0.0798	-0.152**	-0.215**	-0.0424	-0.120	-0.107	-0.534**	-0.0319
	(0.162)	(0.0178)	(0.0587)	(0.0680)	(0.0825)	(0.0745)	(0.0954)	(0.0404)
Baseline Task Score ^3	0.00262	0.00641**	0.0341	-0.00919	0.0484	0.00315	0.207**	-0.0220
	(0.141)	(0.00134)	(0.0398)	(0.00862)	(0.0460)	(0.00785)	(0.0350)	(0.0289)
Constant	0.519**	0.217**	0.511**	0.134	0.205	0.220*	0.624*	-0.0425
	(0.138)	(0.0405)	(0.0764)	(0.102)	(0.153)	(0.104)	(0.227)	(0.0864)
Count	152	327	489	657	330	506	330	506
R-squared	0.113	0.528	0.616	0.544	0.142	0.441	0.123	0.286

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*

A10.2 Expanded DiD Regression – Specification & Results

The second additional model is an expanded version of the specification found in the body of the paper. In this extended model we include all the information in the original model, in addition to the following:

- **Grade Level & Bridge Interaction Terms:** To allow for differing levels of achievement across grades and school type;
- **Gender & Bridge Interaction Term:** To allow for differing levels of achievement of girls at different school types;

This translates into the following model specification for our regression analysis:

$$\textit{midline subtask score} = \beta_0 + \beta_1(\textit{treatment}) + \beta_2(\textit{grade 1}) + \beta_3(\textit{grade 2}) + \beta_4(\textit{grade 3}) + \beta_5(\textit{grade 1*treatment}) + \beta_6(\textit{grade 2*treatment}) + \beta_7(\textit{grade 3*treatment}) + \beta_8(\textit{baseline subtask score}) + \beta_9(\textit{baseline subtask score}^2) + \beta_{10}(\textit{baseline subtask score}^3) + \beta_{11}(\textit{age}) + \beta_{12}(\textit{female}) + \beta_{13}(\textit{female*treatment}) + \beta_{14}(\textit{attended school last year}) + \beta_{15}(\textit{has electricity}) + \beta_{16}(\textit{\# of years of ECE}) + \beta_{17}(\textit{\# of meals}) + \beta_{18}(\textit{reads to someone at home}) + \beta_{19}(\textit{asset index}) + \beta_{20}(\textit{school activities with parents index}) + \beta_{21}(\textit{other activities with parents index}) + \beta_{22}(\textit{speaks English at home}) + \varepsilon$$

The results from this expanded model are consistent in statistical significance with the results stated in the paper for EGRA, but differ slightly for EGMA. Although the results are qualitatively unchanged, we saw a change in statistical significance for two EGMA sub-tasks. In our expanded model, we no longer find the Bridge effect to be statistically significant for the addition 2 subtask due to a reduction in power. We also noticed that the Bridge effect for word problems increased in statistical significance due to an increased co-efficient size. See Tables 38-41 for detailed results.

Table 38. Expanded Model – Raw EGRA Results

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	14.78**	0.00266	1.289**	3.849*	5.727**	0.0573**
	(3.183)	(0.0674)	(0.392)	(1.506)	(1.647)	(0.0170)
Student in Grade 1	0.748	-0.0369	0.355	0.683		
	(1.686)	(0.0541)	(0.337)	(0.959)		
Student in Grade 2	-0.737	0.0623	0.956**	1.355	3.267*	0.0453**
	(1.635)	(0.0509)	(0.352)	(1.312)	(1.289)	(0.0145)
Student in Grade 3			0.683+	2.251*	-0.392	0.0773**
			(0.341)	(1.073)	(1.727)	(0.0142)
Grade 1 * Bridge	-3.812	0.0497	0.388	0.516		
	(4.294)	(0.0802)	(0.468)	(2.010)		
Grade 2 * Bridge	0.0467	0.0485	0.679	1.348	-1.251	0.0316
	(4.484)	(0.0820)	(0.589)	(2.079)	(2.038)	(0.0322)
Grade 3 * Bridge			0.115	-1.189	5.176+	0.0287
			(0.558)	(2.067)	(2.973)	(0.0419)
Baseline Task Score	1.605**	-0.248	2.324*	1.374**	1.780**	-0.275
	(0.470)	(0.341)	(1.066)	(0.225)	(0.292)	(0.441)
Baseline Task Score ^2	-0.0202	1.336	-0.214	-0.00489	-0.00431	4.753*
	(0.0331)	(1.346)	(0.326)	(0.0140)	(0.0165)	(2.211)
Baseline Task Score ^3	0.000178	-1.047	0.00836	-0.0000120	-0.0000663	-3.893+
	(0.000503)	(1.291)	(0.0208)	(0.000206)	(0.000264)	(2.190)
Age	0.500+	0.00228	-0.0382	-0.0427	-0.620**	-0.00782*
	(0.274)	(0.00395)	(0.0432)	(0.124)	(0.225)	(0.00322)
Female	0.00243	0.000263	0.0154	0.0198	-0.609	-0.0131
	(0.507)	(0.0353)	(0.193)	(0.621)	(1.004)	(0.0156)
Female * Bridge	-2.213	-0.0170	-1.627**	-1.112	-0.245	-0.0375
	(2.080)	(0.0531)	(0.435)	(1.198)	(1.754)	(0.0235)
Attended School Last Year	-0.446	-0.0186	0.633**	0.911	1.051	0.00368
	(1.632)	(0.0366)	(0.219)	(1.000)	(1.792)	(0.0227)
Has Electricity	-0.661	0.0160	-0.640**	-0.146	-1.855	-0.0327+
	(1.089)	(0.0292)	(0.233)	(0.621)	(1.186)	(0.0181)
Years of ECE	1.162	0.00637	0.0224	0.246	2.097*	0.0107
	(0.793)	(0.0166)	(0.128)	(0.419)	(0.884)	(0.00978)
Meal Count	0.110	0.0119	-0.00961	-0.343	-0.197	-0.00310
	(0.599)	(0.0137)	(0.103)	(0.367)	(0.612)	(0.00829)
Reads Aloud at Home	1.095	0.0402	0.0981	0.545	1.879*	0.0135
	(1.108)	(0.0275)	(0.185)	(0.652)	(0.793)	(0.0102)
Asset Index	-0.841	0.0201	0.197	0.860	0.993	0.00616
	(2.228)	(0.0463)	(0.405)	(1.319)	(2.232)	(0.0304)
School Activity with Parent Index	1.967	-0.0376	0.337	-0.358	-0.249	0.0247
	(1.537)	(0.0367)	(0.470)	(0.851)	(1.481)	(0.0181)
Other Activity with Parent Index	0.744	-0.0520	-0.0929	-0.758	0.588	-0.00492
	(1.420)	(0.0382)	(0.305)	(0.987)	(2.318)	(0.0301)
Speaks English at Home	-1.786	0.0250	0.0234	0.929	0.405	0.0141
	(1.425)	(0.0208)	(0.248)	(0.671)	(1.158)	(0.0163)
Constant	-5.573	0.226**	-0.341	-0.145	-0.330	0.0534
	(3.564)	(0.0632)	(0.680)	(2.196)	(4.528)	(0.0585)
Count	461	461	626	626	490	490
R-squared	0.519	0.112	0.337	0.666	0.640	0.326

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

Table 39. Expanded Model – Standardized EGRA Results

	(1) Letter Sounds	(2) Onset Sounds	(3) Non-word Reading	(4) Familiar Word Reading	(5) Passage Fluency	(6) Reading Comp.
Bridge	2.292**	0.0118	1.080**	0.564*	0.663**	0.675**
	(0.494)	(0.299)	(0.328)	(0.221)	(0.191)	(0.201)
Student in Grade 1	0.116	-0.164	0.298	0.100		
	(0.261)	(0.240)	(0.282)	(0.141)		
Student in Grade 2	-0.114	0.276	0.801**	0.199	0.378*	0.533**
	(0.254)	(0.225)	(0.295)	(0.192)	(0.149)	(0.170)
Student in Grade 3			0.572+	0.330*	-0.0453	0.910**
			(0.286)	(0.157)	(0.200)	(0.167)
Grade 1 * Bridge	-0.591	0.220	0.325	0.0756		
	(0.666)	(0.355)	(0.392)	(0.295)		
Grade 2 * Bridge	0.00725	0.215	0.569	0.198	-0.145	0.372
	(0.695)	(0.363)	(0.494)	(0.305)	(0.236)	(0.379)
Grade 3 * Bridge			0.0961	-0.174	0.599+	0.338
			(0.468)	(0.303)	(0.344)	(0.494)
Baseline Task Score	1.531**	0.203+	2.211*	1.328**	1.728**	-0.0251
	(0.371)	(0.112)	(0.913)	(0.129)	(0.181)	(0.334)
Baseline Task Score ^2	-0.124	0.137	-0.248	-0.0345	-0.0464	0.377*
	(0.196)	(0.108)	(0.369)	(0.0777)	(0.109)	(0.173)
Baseline Task Score ^3	0.00738	-0.0533	0.0119	-0.000560	-0.00494	-0.0281+
	(0.0209)	(0.0657)	(0.0297)	(0.00959)	(0.0197)	(0.0158)
Age	0.0775+	0.0101	-0.0320	-0.00627	-0.0718**	-0.0920*
	(0.0425)	(0.0175)	(0.0362)	(0.0182)	(0.0261)	(0.0378)
Female	0.000377	0.00116	0.0129	0.00291	-0.0705	-0.155
	(0.0786)	(0.156)	(0.162)	(0.0911)	(0.116)	(0.183)
Female * Bridge	-0.343	-0.0753	-1.364**	-0.163	-0.0283	-0.441
	(0.323)	(0.235)	(0.365)	(0.176)	(0.203)	(0.276)
Attended School Last Year	-0.0691	-0.0826	0.530**	0.134	0.122	0.0433
	(0.253)	(0.162)	(0.183)	(0.147)	(0.207)	(0.267)
Has Electricity	-0.103	0.0708	-0.536**	-0.0215	-0.215	-0.385+
	(0.169)	(0.129)	(0.196)	(0.0910)	(0.137)	(0.213)
Years of ECE	0.180	0.0282	0.0188	0.0361	0.243*	0.125
	(0.123)	(0.0734)	(0.107)	(0.0615)	(0.102)	(0.115)
Meal Count	0.0170	0.0528	-0.00806	-0.0503	-0.0228	-0.0365
	(0.0929)	(0.0605)	(0.0861)	(0.0538)	(0.0709)	(0.0976)
Reads Aloud at Home	0.170	0.178	0.0822	0.0800	0.217*	0.159
	(0.172)	(0.122)	(0.155)	(0.0957)	(0.0918)	(0.120)
Asset Index	-0.130	0.0893	0.165	0.126	0.115	0.0725
	(0.345)	(0.205)	(0.340)	(0.193)	(0.258)	(0.357)
School Activity with Parent Index	0.305	-0.167	0.282	-0.0525	-0.0288	0.291
	(0.238)	(0.163)	(0.394)	(0.125)	(0.171)	(0.213)
Other Activity with Parent Index	0.115	-0.231	-0.0779	-0.111	0.0681	-0.0579
	(0.220)	(0.169)	(0.256)	(0.145)	(0.268)	(0.354)
Speaks English at Home	-0.277	0.111	0.0196	0.136	0.0469	0.166
	(0.221)	(0.0922)	(0.208)	(0.0984)	(0.134)	(0.192)
Constant	-0.699	-0.0210	-0.00335	0.215	0.426	0.260
	(0.534)	(0.296)	(0.621)	(0.370)	(0.578)	(0.683)
Count	461	461	626	626	490	490
R-squared	0.519	0.112	0.337	0.666	0.640	0.326

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 5 and 6, which omit the Grade 1 dummy and interaction as Kindergarten students were not administered those subtasks.*

Table 40. Expanded Model – Raw EGMA Results

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	8.144	-0.166	-0.0236	2.651*	0.0934	2.560**	0.0307	0.0796*
	(6.158)	(1.847)	(0.0430)	(1.043)	(0.0746)	(0.616)	(0.0914)	(0.0329)
Student in Grade 1		-1.034	-0.0176	-0.209				
		(0.775)	(0.0315)	(0.505)				
Student in Grade 2			0.0526	1.237*		1.141*		0.0932*
			(0.0351)	(0.568)		(0.522)		(0.0343)
Student in Grade 3				1.697**	0.0171	1.853**	-0.0435	0.0949*
				(0.500)	(0.0518)	(0.507)	(0.0683)	(0.0426)
Grade 1 * Bridge		2.057	0.0337	1.144				
		(2.019)	(0.0542)	(1.133)				
Grade 2 * Bridge			0.0630	0.129		-0.489		-0.00398
			(0.0541)	(1.155)		(0.869)		(0.0611)
Grade 3 * Bridge				0.225	0.0961	-0.878	0.0775	-0.0337
				(1.263)	(0.0712)	(0.720)	(0.0966)	(0.0504)
Baseline Task Score	0.619	1.066**	1.470**	0.691**	0.603	0.975**	1.611**	0.229
	(1.258)	(0.0973)	(0.269)	(0.207)	(0.389)	(0.227)	(0.326)	(0.269)
Baseline Task Score ^2	-0.00401	-0.00917**	-1.140+	0.00779	-0.583	-0.0367	-3.780**	0.624
	(0.0264)	(0.00122)	(0.638)	(0.0214)	(0.891)	(0.0270)	(0.803)	(0.650)
Baseline Task Score ^3	0.00000787	0.0000201**	0.395	-0.000677	0.261	0.000361	2.583**	-0.482
	(0.000163)	(0.00000457)	(0.416)	(0.000424)	(0.588)	(0.000508)	(0.616)	(0.437)
Age	1.934	-0.0541	0.00828*	0.274**	-0.0195+	0.0638	-0.00742	0.00215
	(1.059)	(0.181)	(0.00366)	(0.0601)	(0.00953)	(0.0722)	(0.00929)	(0.00505)
Female	7.257	-1.988**	-0.0595+	-0.705+	0.0703	-1.327**	-0.0533	-0.0257
	(6.403)	(0.528)	(0.0311)	(0.390)	(0.0748)	(0.273)	(0.0639)	(0.0194)
Female * Bridge	-25.29*	2.348	0.0300	-1.002+	-0.107	0.243	0.0432	-0.0344
	(10.84)	(1.680)	(0.0380)	(0.557)	(0.0897)	(0.433)	(0.0748)	(0.0337)
Attended School Last Year	4.521	-1.402	-0.0385	0.166	0.00525	-0.303	0.0251	0.0650+
	(8.385)	(0.952)	(0.0363)	(0.437)	(0.0641)	(0.526)	(0.0545)	(0.0355)
Has Electricity	-5.950	0.598	-0.0128	-0.231	-0.0457	0.105	0.0182	-0.00563
	(5.355)	(0.855)	(0.0253)	(0.357)	(0.0344)	(0.352)	(0.0322)	(0.0199)
Years of ECE	-5.056	1.171*	0.0212	0.390+	-0.0131	-0.0388	0.0260	0.00220
	(5.667)	(0.476)	(0.0156)	(0.218)	(0.0211)	(0.241)	(0.0208)	(0.0129)
Meal Count	-4.845	-0.0592	-0.0129	0.190	0.00444	0.173	-0.0582*	0.00824
	(2.825)	(0.393)	(0.0106)	(0.180)	(0.0195)	(0.164)	(0.0230)	(0.0158)
Reads Aloud at Home	-7.254	0.281	-0.0221	0.341	0.0746*	-0.0394	0.0405	0.00752
	(5.739)	(0.660)	(0.0174)	(0.355)	(0.0319)	(0.325)	(0.0265)	(0.0190)
Asset Index	14.69	-0.0759	-0.0183	0.784	-0.0313	0.311	-0.0619	0.0449
	(14.20)	(1.574)	(0.0486)	(0.710)	(0.0602)	(0.723)	(0.0652)	(0.0528)
School Activity with Parent Index	7.621	1.477	0.0595+	0.174	0.0499	0.528	0.127**	0.0192
	(8.151)	(1.800)	(0.0307)	(0.467)	(0.0603)	(0.439)	(0.0379)	(0.0249)
Other Activity with Parent Index	-5.810	-1.265	-0.0244	-0.861+	-0.00237	-0.640	-0.0603	-0.0643
	(10.94)	(1.061)	(0.0225)	(0.489)	(0.0291)	(0.499)	(0.0549)	(0.0404)
Speaks English at Home	5.123	0.974	0.0198	0.672+	0.0291	0.549	0.0535	0.0358
	(7.756)	(0.637)	(0.0251)	(0.353)	(0.0371)	(0.326)	(0.0431)	(0.0230)
Constant	27.58	4.895*	0.117+	-2.159+	0.488*	0.999	0.352+	0.114
	(17.74)	(2.344)	(0.0665)	(1.091)	(0.197)	(1.410)	(0.195)	(0.0973)
Count	136	305	461	625	320	490	320	490
R-squared	0.195	0.540	0.630	0.579	0.183	0.465	0.194	0.310

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*

Table 41. Expanded Model – Standardized EGMA Results

	(7) One to One Counting	(8) Number Id.	(9) Quantity Disc.	(10) Addition 1	(11) Addition 2	(12) Subtraction 1	(13) Subtraction 2	(14) Word Problems
Bridge	0.248	-0.00948	-0.0763	0.598*	0.319	0.620**	0.117	0.307*
	(0.188)	(0.106)	(0.139)	(0.235)	(0.255)	(0.149)	(0.348)	(0.127)
Student in Grade 1		-0.0591	-0.0570	-0.0472				
		(0.0443)	(0.102)	(0.114)				
Student in Grade 2			0.170	0.279*		0.276*		0.359*
			(0.114)	(0.128)		(0.126)		(0.132)
Student in Grade 3				0.383**	0.0583	0.448**	-0.166	0.366*
				(0.113)	(0.177)	(0.123)	(0.260)	(0.164)
Grade 1 * Bridge		0.118	0.109	0.258				
		(0.115)	(0.175)	(0.256)				
Grade 2 * Bridge			0.204	0.0292		-0.118		-0.0153
			(0.175)	(0.261)		(0.210)		(0.235)
Grade 3 * Bridge				0.0509	0.328	-0.213	0.295	-0.130
				(0.285)	(0.243)	(0.174)	(0.368)	(0.194)
Baseline Task Score	0.321	0.888**	0.766**	0.717**	0.274**	0.652**	0.173+	0.497**
	(0.193)	(0.0914)	(0.0809)	(0.0506)	(0.0796)	(0.0539)	(0.0936)	(0.0912)
Baseline Task Score ^2	-0.0987	-0.150**	-0.211**	-0.0122	-0.0840	-0.130	-0.466**	-0.00781
	(0.215)	(0.0191)	(0.0608)	(0.0658)	(0.0775)	(0.0819)	(0.104)	(0.0407)
Baseline Task Score ^3	0.00845	0.00614**	0.0377	-0.0133	0.0223	0.00617	0.178**	-0.0325
	(0.175)	(0.00140)	(0.0397)	(0.00831)	(0.0504)	(0.00867)	(0.0426)	(0.0294)
Age	0.0590	-0.00309	0.0268*	0.0617**	-0.0665+	0.0154	-0.0282	0.00828
	(0.0323)	(0.0103)	(0.0118)	(0.0136)	(0.0326)	(0.0175)	(0.0353)	(0.0195)
Female	0.221	-0.114**	-0.193+	-0.159+	0.240	-0.321**	-0.203	-0.0988
	(0.195)	(0.0302)	(0.101)	(0.0880)	(0.256)	(0.0661)	(0.243)	(0.0749)
Female * Bridge	-0.772*	0.134	0.0972	-0.226+	-0.364	0.0589	0.164	-0.132
	(0.331)	(0.0961)	(0.123)	(0.126)	(0.306)	(0.105)	(0.285)	(0.130)
Attended School Last Year	0.138	-0.0802	-0.125	0.0376	0.0179	-0.0733	0.0954	0.250+
	(0.256)	(0.0544)	(0.117)	(0.0987)	(0.219)	(0.127)	(0.207)	(0.137)
Has Electricity	-0.182	0.0342	-0.0414	-0.0522	-0.156	0.0253	0.0693	-0.0217
	(0.163)	(0.0489)	(0.0819)	(0.0806)	(0.118)	(0.0852)	(0.123)	(0.0768)
Years of ECE	-0.154	0.0669*	0.0685	0.0880+	-0.0447	-0.00938	0.0988	0.00849
	(0.173)	(0.0272)	(0.0505)	(0.0493)	(0.0719)	(0.0582)	(0.0790)	(0.0496)
Meal Count	-0.148	-0.00338	-0.0419	0.0429	0.0152	0.0420	-0.221*	0.0318
	(0.0862)	(0.0225)	(0.0342)	(0.0406)	(0.0667)	(0.0398)	(0.0874)	(0.0608)
Reads Aloud at Home	-0.221	0.0161	-0.0715	0.0770	0.255*	-0.00953	0.154	0.0290
	(0.175)	(0.0377)	(0.0564)	(0.0802)	(0.109)	(0.0787)	(0.101)	(0.0733)
Asset Index	0.448	-0.00434	-0.0592	0.177	-0.107	0.0753	-0.236	0.173
	(0.433)	(0.0900)	(0.157)	(0.160)	(0.206)	(0.175)	(0.248)	(0.203)
School Activity with Parent Index	0.233	0.0845	0.193+	0.0393	0.170	0.128	0.484**	0.0738
	(0.249)	(0.103)	(0.0994)	(0.106)	(0.206)	(0.106)	(0.144)	(0.0958)
Other Activity with Parent Index	-0.177	-0.0723	-0.0791	-0.194+	-0.00808	-0.155	-0.229	-0.248
	(0.334)	(0.0607)	(0.0729)	(0.110)	(0.0994)	(0.121)	(0.209)	(0.156)
Speaks English at Home	0.156	0.0557	0.0642	0.152+	0.0994	0.133	0.204	0.138
	(0.237)	(0.0364)	(0.0812)	(0.0796)	(0.127)	(0.0790)	(0.164)	(0.0884)
Constant	0.146	0.266+	0.487+	-0.823**	0.918	0.0239	1.149	-0.585
	(0.708)	(0.151)	(0.269)	(0.255)	(0.661)	(0.359)	(0.694)	(0.366)
Count	136	305	461	625	320	490	320	490
R-squared	0.195	0.540	0.630	0.579	0.183	0.465	0.194	0.310

*Note: Standard errors in parentheses, clustered at the school-grade level; + p<0.10, * p<0.05, ** p<0.01. Omitted grade level dummy and interaction term is Kindergarten, except for regressions 11-14. In regressions 11 and 13, only 2nd and 3rd Graders were given the subtasks. In regressions 12 and 14, only 1st – 3rd graders were given the subtasks.*