Summative Evaluation of the NOKIA & Pearson Foundation BridgIt India Project Year 1 2011-12 School Year

Prepared by EZ Vidya Pvt. Ltd.

Matt Wennersten
matt@ezvidya.com

Dr. Zubeeda Banu Qureshy
zubeedaq@ezvidya.com
Implementation of Bridge-IT India was made possible through the kind participation of Andhra Pradesh Residential Educational Institutions Society, Chennai Corporation and participating private schools. We thank them for their valuable support.

EZ Vidya would also like to expressly thank all of the participating teachers, who welcomed us into their classrooms for the benefit of all students.

A life without change
Becomes stagnant and stinks
But life with change
Blossoms like the jasmine
NOKIA, which means connecting people,
Now joins our school teachers
On a successful journey for students

Tamil poem written by teacher tn14 of school TNGOV008
"NOKIA project has changed the way I teach."

- “AP25”, 2011-12 Participating English Teacher

In April 2011, NOKIA and the Pearson Foundation engaged EZ Vidya to evaluate the effectiveness of implementing NOKIA Education Delivery (NED) with Pearson Foundation audio-visual content in Indian schools, and to identify how to scale the intervention at low increment cost.

NOKIA Education Delivery (NED) is a mobile phone video content platform. 5th & 6th standard English and Science teachers were given a NOKIA C7 phone and a TV-out cable. EZ Vidya broadcast educational videos over the 3G network, which teachers showed to students in class by connecting the phone to a TV or LCD projector. With each video, EZ Vidya also provided activity guides - suggested teaching strategies for improving the quality of teaching. EZ Vidya field staff visited each participating school on rotation to support teachers and gather data. Evaluation of a similar programme in the Philippines had proved that the use of NED can improve student engagement, attendance, and academic performance. Year 1 of NED in India attempted to verify whether the same was true in India. The NED implementation had four objectives:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To improve the quality of teaching</td>
<td>Achieved – teacher effectiveness improved by 31%, teaching style changed on average from “telling” to “constructivist”, and students took more active roles in the classroom</td>
</tr>
<tr>
<td>2. To create a meaningful improvement in academic and attitudinal outcomes for Indian students</td>
<td>Achieved – statistically significant improvements in student learning in Science, with students improving by 10% more overall marks than controls. (The NED impact in English was not statistically significant.)</td>
</tr>
<tr>
<td>3. To provide innovative technology and content to schools, leveraging the NOKIA Education Delivery (NED) platform, 3G networks and NOKA mobile phones with TV-out cables to broadcast educational content to classrooms</td>
<td>Achieved – Over 7Gb of content delivered to schools, with teachers playing an average of 158 media items per phone</td>
</tr>
<tr>
<td>4. To identify successful strategies for overcoming barriers to scale</td>
<td>Achieved – feedback from school partners and experiments with phone plans and support models indicate that NED can scale in India in a sustainable way, with increasing contributions from local schools, at lower cost and higher usage than alternative technologies.</td>
</tr>
</tbody>
</table>
The program has been a great success. Students have shown real learning gains, better attendance and higher engagement. As in Manila, NED in India helped most those most in need of help. For Govt Science students at low academic achievement schools, NED was an equalizer, lifting average post-test scores from a lower base to levels similar to high academically achieving schools.

On aggregate, NED classrooms outperformed controls by a large margin, despite control being overweight in higher performing sections:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Control (Change Pre to Post test without NED)</th>
<th>Treatment (Change Pre to Post test with NED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>+11%</td>
<td>+14%</td>
</tr>
<tr>
<td>English</td>
<td>+8%</td>
<td>+18%</td>
</tr>
</tbody>
</table>

The strong positive effect, where NED students scores improved by roughly 10% more marks than controls, can be attributed to NED with a high degree of confidence. Learning gains appear to come from a combination of higher engagement, availability of high quality content at low cost, and change in teaching methods.

Evaluation specifically targeted multiple states and types of schools, teachers, and students in order to identify conditions particular to a demographic that would inhibit scaling up. EZ Vidya found that NED impact was highest at lower profile, government schools. Students who started off at lower proficiency levels appeared to benefit more. Teacher and manager attitudes appear to be a major and important determinant of success. However, objective teacher characteristics were no predictor of success – teachers of all ages and skills levels took to NED.

The NOKIA mobile proved to be a unique platform for empowering teachers. Teachers with limited technology skills used NED enthusiastically. Teacher feedback was overwhelmingly positive. Once teachers began to use regularly, they kept at it, and even long gaps between site visits did not appear to affect usage. Logged usage was strong even though NED automated statistics systematically underestimated the amount of NED video content used by teachers. Teachers used NED more regularly and students experienced academic gains at a lower cost relative to the dominant technology alternative of a PC lab. Teachers’ attitudes to technology changed, shedding much of the apprehension associated with PCs.

"With Bridgetit programme I started using technology" – ap15

Even more significant than the student gains, NED changed the way teachers taught. NED had a strong, positive, and statistically significant effect on observed teaching. Lesson quality went up and traditional style (DI) teaching went down. Quality improved dramatically across both subjects:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-NED</th>
<th>Post-NED</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of Lessons Rated as “High” Quality</td>
<td>43% (23/54)</td>
<td>74% (84/115)</td>
<td>+31%</td>
</tr>
<tr>
<td>Proportion of Lessons Rated as “DI”</td>
<td>74% (40/54)</td>
<td>50% (58/115)</td>
<td>-24%</td>
</tr>
</tbody>
</table>

The effect was stronger among teachers who experienced NED longer, and stronger in Science than in English. Before NED, teachers were motivated to teach in a student-centred way but mainly did not. Through NED, they either learned new strategies or applied previously known strategies more effectively. NED gave teachers the means to achieve their stated goals, goals they had been limited in their ability to achieve prior to NED despite motivation to do so.

---

1 NED was deployed for 30 weeks in AP and TN CBSE schools, but only 11 weeks in TN Govt schools.
With NED, the proportion of passive students dropped and the proportion of enthusiastic students increased. Students, previously satisfied with relatively dry lessons, developed higher expectations for teachers. Teachers realized that passive or quiet students were not necessarily “slow learners” and would participate in class if taught in a new way.

Three factors seemed to influence impact the most:

1. availability of content closely aligned to the teacher’s primary textbook;
2. motivation of the teacher;
3. baseline achievement levels of the students.

The 1:1 model with a relatively expensive C7 phone had significant positive effects on teacher empowerment and motivation, enabling easy outreach and engendering pride in teachers. Teachers watched videos at home on the phone to plan their lessons, took photographs and videos with the phone camera and downloaded content from other sources to use in class.

Four factors are predicted to influence the ability of the programme to scale to different contexts:

1. backing and monitoring of the programme by school managers;
2. degree of variation of new textbooks from those already mapped to content – English books were extremely divergent from school board to school board;
3. willingness of schools to fund individual usage for teachers and allow teachers to hold the phones;
4. ability to provide relatively intense face-to-face support to teachers in initial phases of the project, logistically and otherwise.

Other factors, such as school location, students’ native language, 3G download speed, teacher tech savvy, reliable power supply, etc. seemed to be unimportant. Importantly, access to 3G networks was not a barrier to scale, opening up opportunities in rural regions.

From a standing start in April 2011, NED reached 53 teachers at 34 schools in 2 states, and has had a positive impact on almost 2,000 students. Based on the results of Year 1, school partners have embraced the platform and are increasing both scale and their contribution to the overall project budget. The project is poised to triple in size for year 2, with schools’ share of the budget going from 10% to 30%.

“Nokia has done a great job by introducing the new concept in the teaching and learning arena. The students go just crazy in the class. They are more interested, motivated and enthusiastic and so are we.” – ap30

---

2 12 months is an extremely rapid planning and deployment period. Other BridgeIt projects typically allocate 6-12 months for planning, with teachers receiving phones in Year 2 of the project.
# Table of Contents

Summary ................................................................................................................................. 3  
Table of Contents .................................................................................................................... 6  
Project Overview .................................................................................................................... 7  
  Backdrop ............................................................................................................................. 7  
  A Better Way ........................................................................................................................ 7  
  Project Objectives ............................................................................................................... 8  
  Brief Programme Description ............................................................................................. 8  
Implementation Overview ...................................................................................................... 9  
  Planned Scope ..................................................................................................................... 9  
  School Partners .................................................................................................................. 10  
  Planned Treatment ............................................................................................................. 10  
  Actual Scope (Variance from Planned Scope & Treatment) ................................................ 11  
  Timeline Summary ............................................................................................................ 13  
Methodology ........................................................................................................................... 14  
  Objectives of the Endline Evaluation ............................................................................... 14  
  Key Factors of Student Achievement ............................................................................. 14  
  Theory of Change & Hypothesis ....................................................................................... 15  
  Indicators & Means of Verification .................................................................................. 15  
The Sample – Schools ............................................................................................................ 17  
  Selected School Data (includes Controls) ........................................................................ 19  
  The Sample – Teachers ...................................................................................................... 19  
  Selected Baseline Teacher Data ......................................................................................... 21  
  Experimental Design & Controls ...................................................................................... 21  
  Evaluation Database .......................................................................................................... 22  
  Data Gathering Methodology ............................................................................................. 23  
Bridget India 2011-12 By The Numbers ............................................................................... 27  
Evidence of the Impact of NED ............................................................................................ 28  
  Academic Learning Gains ................................................................................................. 28  
  Student Engagement ........................................................................................................... 31  
  Instructional Delivery ......................................................................................................... 32  
Sustainable Models ............................................................................................................... 34  
  Self-Sustainable Usage ...................................................................................................... 34  
  Relative Value & Teacher Empowerment ......................................................................... 35  
  Alternative Support Models .............................................................................................. 36  
  Barriers to Scale ............................................................................................................... 39  
Recommendations for Year 2 ................................................................................................. 44  
Appendices ............................................................................................................................ 45  
  Appendix A – Confidentiality and Terms of Use ............................................................... 45  
  Appendix B – List of Annexures and Source Data ............................................................. 45  
  Appendix C – General School Conditions ....................................................................... 45  
  Appendix D – Representativeness of the Sample ............................................................... 46  
  Appendix E – Theme & Variable Definitions .................................................................... 47  
  Appendix F – Teachers’ Goals as Reported during Baseline & Endline ............................ 51  
  Appendix G – Support Tickets by Type ............................................................................ 51  
  Appendix H – Project Consortium .................................................................................... 52
Project Overview

Backdrop

As little as ten years ago in India, idli cost 5 paise and a 1 minute phone call cost 5 rupees. Now these prices are reversed and phones are widespread. India’s Census 2011 shows that well more than half of all households have phones, even while less than half have toilets. In Delhi, for example, 91% of people have phones.3

In contrast to this story of rapid change, a step inside most of India’s 1.3 million schools is a step back in time: India’s classrooms would be easily recognizable to teachers from 1900. The dominant technology is chalk. The dominant organizational structure is “lecture style”, with students arranged in rows of wooden desks facing a blackboard4. School and teacher quality across India is poor5.

The net result is failing Indian students. In 2011, less than 50% of children who were in school and studying in grade 5 could not read story text at grade 2 level of difficulty6. Drop out rates are high. Those who do graduate are unprepared for the job market7. Most at risk of drop out are students from low-income, low-education households. Within this group, girl children are astonishingly vulnerable. More than 50 per cent of girls fail to enroll in school; those that do are likely to drop out by the age of 12. 53% of girls in the age group of 5 to 9 years are illiterate8.

A Better Way

NOKIA recognized almost ten years ago that mobiles are a unique platform for empowering teachers. In partnership with The Pearson Foundation, NOKIA pioneered video distribution over mobiles in 2003 via the Philippines Text2Teach project. The model was simple – identify local education partners, help them distribute phones to schools, load educational videos on a central broadcast server, and use the phones to receive videos. Teachers could then play the videos on a normal TV during appropriate lessons in their syllabus, and try activities suggested in the videos or accompanying support materials. Text2Teach was extremely successful. According to an independent evaluation, “in an environment where pupils already manifest learning gains…the effect of Text2Teach is to further enhance the gains” and “in an environment not optimally conducive to effective learning…Text2Teach can spell the difference between some learning and no learning at all.”9

NOKIA and The Pearson Foundation therefore decided to implement Text2Teach globally under the programme name of Bridg<em>it</em>, as a 3-year Mobiles in Education corporate social responsibility (CSR) project in selected countries. In late 2010, NOKIA identified India as a strategic country for the Bridge<em>it</em> intervention. Mobiles had penetrated to the village level, at increasingly lower price points – almost every teacher had a phone. In addition, almost every school had a television (or access to one).

India was also of interest because by 2010, government, NGO and for-profits in India had piloted numerous PC-based technology projects in schools. Despite commercial success for computer lab products, actual classroom usage remained low and teachers commonly reported apprehension about using computers. 22% of teachers surveyed across Delhi, Punjab, and Tamil Nadu had never

---

4 October 2010 MIT Technology Review – India Edition: “chalks and blackboards are still the most widely used teaching tools…in most municipal schools in India”
5 <http://www.azimpremjifoundation.org/pdf/OBES-quality-Efficiency-education.pdf> “the quality and cost-efficiency of government-funded schools needs to be greatly improved”
6 Pratham ASER 2011 survey <http://www.pratham.org>
7 E.g. “India graduates millions, but too few are fit to hire” Wall Street Journal April 5, 2011
8 Sarva Shiksha Abhiyan <http://www.ssa.nic.in/>
browsed the Internet\textsuperscript{10}. While teachers struggled or felt threatened by computers, they all could use phones.

“Our teachers are poor users of technology, even though India is one of the largest producers of technology in the world today.”

- Dr S P Thiyagarajan, Pro-Chancellor (Research) of Sri Ramachandra University

In March of 2011, NOKIA and The Pearson Foundation selected EZ Vidya as the local implementation partner for Bridgeit India. This report describes the results of the first year of implementation in India, for the school year June 2011- April 2012.

**Project Objectives**

The 2011-12 objectives of the Bridgeit India project were:

- To improve the quality of teaching
- To create a meaningful improvement in academic and attitudinal outcomes for Indian students
- To provide innovative technology and content to schools, leveraging the NOKIA Education Delivery (NED) platform, 3G networks and NOKA mobile phones with TV-out cables to broadcast educational content to classrooms
- To identify successful strategies for overcoming barriers to scale

Put simply, over the course of the three-year project duration EZ Vidya was tasked to determine:

1. Will NED work in Indian classrooms to improve learning?
2. Will school partners independently take NED to a large number of classrooms?
3. In what new ways can we use the mobile as a platform to change teaching for the better?

**Brief Programme Description**

5\textsuperscript{th} and 6\textsuperscript{th} standard English and Science teachers receive a NOKIA C7 phone and training on how to use NOKIA Education Delivery (NED). Over the course of the school year, NED broadcasts Pearson Foundation video content to each phone over the 3G network, along with support materials such as suggested lesson plans and activities for use in class.

Using their mobile phone with Nokia Education Delivery software, teachers access and download a catalog of videos. These are stored on a remote server and organized by subject and grade. By connecting the mobile phone to a TV or a projector, the teacher can play the videos to a class, and get help from EZ Vidya by phone call or SMS.


“I attended so many computer programs, but the phone is a simple thing to use in classroom – download and show in class is easy. We have Internet connections and other things [on PC] but it is hard to use. Phone it is easy.”

– ap24, 2011-12 Participating Science Teacher

**Implementation Overview**

Year 1 (2011-12 school year) in India was effectively a pilot, focused on proving that NED is an effective intervention so that school partners would be motivated to scale up.  (Year 2 will focus on scaling up in a sustainable way, identifying useful innovations and communicating lessons learned so that other groups join the initiative.)

**Planned Scope**

In March 2011, EZ Vidya developed a project framework describing a detailed set of planned activities, anticipated outputs, and expected results. Based on this framework, in April 2011, EZ Vidya, NOKIA and The Pearson Foundation agreed on a scope of 28 schools and 60 teachers teaching 2 subjects (English & Science) in 2 grades (5th and 6th standards) across 2 states (Tamil Nadu and Andhra Pradesh).

The scope of the project was carefully chosen to maximize impact and research outcomes for the available budget:

a. Two states allowed the project to inexpensively examine how the impact of the project would vary across language and cultural barriers within India. A single state would not provide insight, while three or more states would consume a large budget for travel and content mapping.

b. EZ Vidya recommended 28 schools as the minimum size to capture schools of different types (large/small, government/private, Telugu/Tamil students, urban/rural, co-ed/single gender) at reliable statistical power for evaluation. Of the 28, 24 would be government and 4 would be private, in order to test whether the intervention could achieve sustainability across sectors and school boards (state syllabi vs central board syllabus or CBSE\textsuperscript{11}), for a total of 12 AP Govt, 12 TN Govt, 2 AP CBSE, and 2 TN CBSE.

c. 5th & 6th standards are critical inflection points in Indian schools. 5th standard is the last primary school grade. 5th standard is also the first grade where many students are expected to learn in English medium, as opposed to their local language. Children often change schools to attend 6th standard. While 5th standard instruction is by “class teacher” (one teacher teaches all subjects), 6th standard typically has specialist subject teachers. 5th & 6th

\textsuperscript{11} For more information on CBSE, please see [http://cbse.nic.in](http://cbse.nic.in)
was also determined in part by the donated Pearson Foundation content, which spanned KG-6.

d. EZ Vidya recommended English & Science from the donated Pearson Foundation content in Science, English, and Mathematics. Previous school projects had shown that teachers’ need for support was greatest in English. Science was included to determine if effects varied across subjects, because it had a larger catalog of Pearson videos than Maths, and because many Science topics were common across state syllabi.

e. Given two subjects and standards, schools would typically have two teachers, for a total of 56 (28 x 2). 60 teachers allowed experimentation with teacher collaboration; some schools could have more than two teachers (and some might have only one).

School Partners

In May 2011, EZ Vidya approached government schools in Andhra Pradesh and Tamil Nadu to participate. In Andhra Pradesh, EZ Vidya had a strong working relationship with the Andhra Pradesh Residential Educational Institutions Society (APREIS), due to a successful partnership for the implementation of IBM Re-Inventing Education (IBM RE). APREIS is an Andhra Pradesh government school agency, following the state syllabus and reporting to the State Principal Secretary of Education and the AP Minister of Education, with approximately 130 fee-free single-sex schools distributed mainly in rural areas across the state. EZ Vidya asked APREIS to nominate a variety of 12 schools (large/small, boys/girls, etc.) within a roughly 200 km radius of Hyderabad, ideally excluding schools that had benefited from another intervention such as IBM RE. As APREIS had mainly rural schools, EZ Vidya approached the Chennai Corporation (CC) in Tamil Nadu to provide 12 urban government schools. Chennai is the capital and largest city in Tamil Nadu; Chennai Corporation is a government entity following the Tamil Nadu state syllabus and managing approximately 100 fee-free schools within Chennai city limits.

EZ Vidya also contacted four private schools in Hyderabad and Chennai to participate – one high and one medium socio-economic profile school in each state, to compare and contrast with the relatively lower profile government schools.

Planned Treatment

Regardless of profile, board, or geography, the programme intervention was planned to be the same for all schools. The planned experimental treatment was:

- Provide a NED equipped C7 phone to each participating teacher in the first term of the school year;
- Train teachers on how to use NED, and, how to employ new teaching strategies complementary to NED;
- Use NED to publish content and activities matching teachers’ syllabi throughout the year over commercial mobile phone networks;
- Provide tapered on-site and remote support, including SMS encouragement to download new content and use NED in class.

EZ Vidya committed to providing teachers with 2 opportunities to use NED for each week of the syllabus, i.e. 30 instructional weeks (excluding revision, exams, etc.) maps to 60 videos per subject and standard, for a projected total of approximately 240 videos and matching activities.

---

12 The Tamil Nadu government syllabus is also known as Samacheer Kalvi. Information about the syllabus can be found at [http://www.textbooksonline.tn.nic.in/Default.htm](http://www.textbooksonline.tn.nic.in/Default.htm)
13 The Pearson Foundation provided a core content library of 166 English and 255 Science videos. EZ Vidya mapped these videos to the school syllabi, and supplemented gaps with EZ Vidya and appropriate public domain/Creative Commons content.
14 On-site orientation and extensive support up-front, with reduced site visits as teachers become more independent.
Actual Scope (Variance from Planned Scope & Treatment)

The actual sample varied from plan in teacher composition and treatment dosage. EZ Vidya asked government and private school partners to nominate schools such that there would be a good mix across all themes and "at risk" students would be well represented. Nominations were then agreed in consultation with the partners, to participate for the full school year from Jun 2011 to Apr 2012. June was reserved for a pre-technology baseline, with phone distribution following training in July.

APREIS nominated 12 schools and 23 (not 24) teachers for the full 2011-12 school year. The 2 TN CBSE schools nominated 6 teachers (instead of 4) for the full year. The 2 AP CBSE schools also nominated 6 teachers. Chennai Corporation nominated 18 (not 12) schools and 18 (not 24) teachers, and for the period from January to March 2012 only. The total scope of the project was therefore 34 schools and 53 teachers, across the target states, subjects, standards, and syllabi, with Chennai Corporation students receiving only 1/3 of the target treatment duration.

APREIS School Participation

APREIS agreed to participate in June 2011. APREIS nominated 12 schools; EZ Vidya reviewed the nominees and noted they were all small schools (less than 500 students), with some overlap with the prior IBM RE project. EZ Vidya asked APREIS to swap two small semi-urban schools for two large rural schools to improve the diversity of sample set. EZ Vidya consultants then visited the list of schools to validate suitable phone signal strength, confirm teacher staffing and interview teachers, verify support of the principal, and check availability of a suitable display device. One school was invalidated – its location, surrounded by hills, blocked cell phone signal. APREIS nominated a replacement school for the experiment; the invalidated school was retained as a control.

The final set of 12 APREIS experimental schools contained 31 teachers of 5th and 6th English and Science. 8 of the 31 teachers declined to participate, preferring to focus on higher classes (same teacher teaching 6th-10th standards) or due to feeling “too much of load”.

EZ Vidya trained the participating 23 teachers at a centralized workshop in Hyderabad on 28-29 July 2011. Teachers began using NED in class in August 2011.

Andhra Pradesh is a large state with three major geographic divisions: Telengana, Andhra, and Rayalaseema. All of the 12 APREIS schools were located in the Telengana region. Sporadically from July, political parties in the Telengana region agitated for a separate state (i.e. split AP into two or more smaller states.) Parties periodically called for “bandh” or strike; the 2011-2012 school year was disrupted for large portions of September and October. APREIS adjusted the school calendar (extending the school year) and EZ Vidya modified the support plan so that pilot schools were able
to use NED throughout the school year, however, usage was low during the 2\textsuperscript{nd} and 3\textsuperscript{rd} month of deployment while schools were closed due to bandh.

**Chennai Corporation School Participation**

EZ Vidya met with the Deputy Commissioner of Education and Chief Education Officer of Chennai Corporation throughout March, April and May 2011. On 14\textsuperscript{th} May, the results of the Tamil Nadu state elections were announced, with the incumbent DMK party losing heavily to the AIADMK party. Several education officials who had worked closely with the DMK government were transferred. More importantly, the new Chief Minister immediately halted the implementation of the Samacheer Kalvi curriculum proposed by the DMK government, in part to remove references inserted by the previous administration. Schools scheduled to start June 1\textsuperscript{st} were delayed as the government scrambled to develop replacement textbooks. On June 10\textsuperscript{th}, with schools rescheduled to open June 15\textsuperscript{th} without textbooks, the AIADMK government was sued over the textbook change. The subsequent litigation and counter-filings delayed the curriculum until Aug 2011; the AIADMK lost the lawsuit and were forced to rollout the new DMK Samacheer Kalvi books, but with “objectionable” content blacked out or covered with stickers. The unusual handling of textbook distribution corresponded with another round of transfers of education officials. By the time textbooks were distributed, the Chennai Corporation Joint Commissioner of Education (JC) had given in-principle approval for the project, for 5\textsuperscript{th} standard English teachers.

The JC nominated 25 English teachers from 25 Chennai primary and middle schools in Sep 2011. EZ Vidya conducted orientation in early Oct 2011. EZ Vidya validated the schools and teachers as in AP – 7 teachers were dropped from the program due to poor health or because of school circumstances, leaving 18 teachers at 18 schools. Actual implementation was then put on hold as Chennai Corporation prepared for a municipal election (education staff are a large part of the labour force for election duties). The AIADMK won the municipal election in late October, resulting in a new Chennai Commissioner, who took office in late November. By December, EZ Vidya met with the new Mayor, new Commissioner, and the Joint Commissioner of Education. The project was formally approved by the new administration in January 2012.

EZ Vidya immediately conducted baseline lesson observations at all CC schools, followed by training and phone distribution in Feb 2012. The Tamil Nadu school year was extended to May 1\textsuperscript{st} due to the Samacheer disruption – teachers used NED in class from 10 Feb 2012 to 24 Apr 2012 (11 weeks), as opposed to the 30 weeks in AP.

**AP CBSE School Participation**

EZ Vidya signed two private school Memoranda of Understanding (MoUs) in Hyderabad in June. APCBSE013 enrolled one 6\textsuperscript{th} standard Science and one 5\textsuperscript{th} standard English teacher. APCBSE014 requested pairs of teachers, in 5\textsuperscript{th} and 6\textsuperscript{th} English and Science (4 teachers), for a total of 6 AP CBSE teachers. Validation and training was conducted on-site and teachers started using NED in Jul 2011. Both schools were strongly affected by teacher turnover. The initial APCBSE013 Science teacher left the school in Nov 2011 – EZ Vidya inducted a substitute teacher, but since this teacher was still responsible for covering her higher classes, she was unable to use NED on a regular basis.
with 6th Science. At APCBSE014, both English teachers left the school during the year due to their husbands being transferred to another city – the 5th teacher in Aug 2011 and the 6th teacher in Feb 2012. APCBSE014 Science teachers used NED throughout the year.

**TN CBSE School Participation**

EZ Vidya signed two private school Memoranda of Understanding (MoUs) in Chennai in June. TNCBSE015 enrolled one 5th standard Science and one 6th standard English teacher. TNCBSE016 requested pairs of teachers, in 5th and 6th English and Science (4 teachers), for a total of 6 TN CBSE teachers. Validation and training was conducted on-site in July and August. Teachers started using NED in early Sep 2011 and continued until the end of the school year in Mar 2012.

**Timeline Summary**
Methodology

Objectives of the Endline Evaluation

The Bridgeit India project framework listed three strategic objectives (SOs):

SO1: To integrate the mobile platform into teaching and evaluate its effectiveness through teachers’ experience of using it in the classroom

SO2: To evaluate learning improvements due to the integration of new technology, content, and methodologies into the teaching processes

SO3: To broaden impact of NOKIA technology in education, evaluate sustainable models, and identify how to scale at low increment cost

Evaluation of similar programs in Tanzania and Philippines proved that the use of NED in the classroom can improve student engagement, attendance, and academic performance. Ultimately, a comparison between pre-treatment and post-treatment teachers and students should answer the following questions for Indian conditions:

• How has teaching & learning changed?
• How have academic outcomes changed?
• How have attitudes towards technology changed?
• How applicable are results to other Indian schools and regions?
• What blocks scalability?
• What elements were most effective?

This report therefore attempts to:

• Define key factors influencing student achievement and describe the mechanism (theory of change) through which NED is hypothesized to affect achievement;
• Describe the study sample and methodology in sufficient detail for independent replication or extension of the experiment in other contexts;
• Present and discuss verifiable evidence of the impact of the intervention, proving or disproving the hypotheses;
• Categorize participating schools, teachers, and students with respect to factors influencing achievement and replicability

Key Factors of Student Achievement

A large body of education research exists on the factors affecting student achievement. Research broadly indicates that student achievement is a product of the interaction of four elements: the learner, the teacher, the school, and the home.

• Learner effects include students’ individual variation in inherent motivation, expectations, brain function (learning ability or disability), and past academic experience.

---

15 Replicability here refers to evidence that the program can achieve similar results in different contexts with minimal modification. In other words, the report attempts to capture enough information about the participating schools to allow independent identification of additional schools as good candidates for scale-up of the project.

Teacher effects include teachers’ level of content mastery, ability to motivate students, experience, preparation & lesson planning, training, technology skills, and expectations for students.

School effects include quality of infrastructure, provision of teaching resources (including technology), school culture (e.g. emotional climate, managerial control, stability, and security within the school environment), curriculum, teacher academic supervision, professional development, and school leadership.

Home effects include parental support for education, ability to attend school, nutrition and health care.

Learner effects are outside the scope of the project – students were not tracked individually. However, skew or bias in the learner population is mitigated by the fact that most schools in the sample are non-selective (lottery admission or mandatory admission of all applicants regardless of ability due to the Right to Education act).

Home effects are primarily driven by household socio-economic status. EZ Vidya used the economic profile of the school as a proxy for home effects.

Evaluation therefore focused on schools, teachers, lessons, and the corresponding aggregate academic performance of the students, supplemented by qualitative feedback from teachers and students.

Theory of Change & Hypothesis

NED is a teacher-directed intervention. We therefore expected that learning gains from NED would come through a combination of teacher and content mechanisms:

1. the quality of instructional delivery by teachers would improve due to their exposure to new teaching strategies and new content;
2. student engagement would improve due to access to more interesting lesson material and more variety of teaching;
3. the productivity of teachers would improve due to the ready availability of resources such as diagrams or activity guides, minimizing extended board-work and lesson planning “search costs”\(^{17}\).

Our hypotheses were:

- Regular use of NED in the classroom, with appropriate content, would produce significant learning gains for students across all types of Indian schools, with “at risk”\(^{18}\) students benefiting the most.
- NED would produce gains at a lower incremental cost relative to other technology interventions.

Indicators & Means of Verification

To prepare the framework, the EZ Vidya project team identified a draft set of variables to represent schools and help in scaling the model in the future. Variables were selected based on factors shown by research to correlate with achievement, such as teacher qualifications and socio-economic status, and variables theorized to inhibit transfer of programs from one context to another, such as school size or local language. A team of consultants and subject-matter-experts (SMEs) in childhood education reviewed the variables, which were then aggregated into “themes” as follows:

\(^{17}\) “Search costs” here refers to time spent by teachers during planning to find appropriate resources for a given topic, whether reviewing the textbook, surfing the Internet, gathering supplies for experiments and demonstrations or developing their own materials.

\(^{18}\) “At risk” here means students from demographics that are known to be most likely to fail to complete school education to 12\(^{th}\) standard: students, especially girl children, from low-income, minimally educated households.
• School:
  o Geographical Location: Rural / Urban and Tamil Nadu / Andhra Pradesh
  o Sector: Public / Private
  o Economic Status: High / Medium / Low
  o Student Strength: Large (>500) / Small (<500)
  o Gender: All Girls / Co-Ed / All Boys
  o Academic Achievement: High / Low
  o School Technology: High / Medium / Low
  o Teacher Quality: High / Medium / Low
  o Preferred Teaching Style: Student-Centred / Direct Instruction
  o Internet Connectivity: Connected / Not Connected

• Teacher:
  o Gender: Male / Female
  o Age: <25, 25-30, 31-40, 41-50, 51+
  o Quality: High / Medium / Low
  o Tech-Savvy: High / Medium / Low
  o Reported Teaching Style: Student-Centred / Direct Instruction
  o Observed Teaching Style: Student-Centred / Direct Instruction
  o Observed Lesson Quality: High / Medium / Low

Themes and their source variables (how ratings are determined) are described in the appendix.
The Sample – Schools
As described in the Implementation Overview, teachers from 34 schools participated in Year 1 of the project, plus 2 otherwise similar but validated out AP government control schools for a total of 36: 14 experimental and 2 control schools in a 150km radius around Hyderabad, Andhra Pradesh (AP) and 20 experimental schools in Chennai, Tamil Nadu (TN).
Schools ranged from large, high profile, high-tech urban private schools to small, low profile, low-tech rural government schools, skewed towards low-tech and lower-profile government schools:

<table>
<thead>
<tr>
<th>School</th>
<th>Loc.</th>
<th>Sector</th>
<th>Econ Profile</th>
<th>Size</th>
<th>Internet</th>
<th>Gender</th>
<th>School Tech</th>
<th>Pref. Teach Style</th>
<th>Average Teacher Quality</th>
<th>Academics</th>
</tr>
</thead>
<tbody>
<tr>
<td>APGOV0001</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Girls</td>
<td>Low</td>
<td>DI</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0002</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Boys</td>
<td>Medium</td>
<td>DI</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0003</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Girls</td>
<td>Low</td>
<td>DI</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0004</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Girls</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0005</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Large</td>
<td>Connected</td>
<td>Boys</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGOV0006</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Girls</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGOV0007</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Boys</td>
<td>Medium</td>
<td>SC</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0008</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Large</td>
<td>Connected</td>
<td>Boys</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGOV0009</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Connected</td>
<td>Boys</td>
<td>Medium</td>
<td>DI</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0010</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Boys</td>
<td>Medium</td>
<td>DI</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>APGOV0011</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Connected</td>
<td>Boys</td>
<td>Low</td>
<td>SC</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGOV0012</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Connected</td>
<td>Girls</td>
<td>Medium</td>
<td>DI</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>APGBSE001</td>
<td>Urban</td>
<td>CBSE</td>
<td>Medium</td>
<td>Large</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>SC</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGBSE002</td>
<td>Urban</td>
<td>CBSE</td>
<td>High</td>
<td>Large</td>
<td>Connected</td>
<td>Co-Ed</td>
<td>High</td>
<td>SC</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>TNCBSE003</td>
<td>Urban</td>
<td>CBSE</td>
<td>Medium</td>
<td>Large</td>
<td>Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>TNCBSE004</td>
<td>Urban</td>
<td>CBSE</td>
<td>High</td>
<td>Large</td>
<td>Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>–</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0001</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0002</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0003</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>SC</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0004</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>–</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0005</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0006</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0007</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0008</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0009</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0010</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0011</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0012</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>High</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0013</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Medium</td>
<td>DI</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0014</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>SC</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0015</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>SC</td>
<td>Low</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0016</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>High</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0017</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>TNGOV0018</td>
<td>Urban</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Co-Ed</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>No Data</td>
</tr>
<tr>
<td>APGOV017</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Girls</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>APGOV018</td>
<td>Rural</td>
<td>Govt</td>
<td>Low</td>
<td>Small</td>
<td>Not Connected</td>
<td>Boys</td>
<td>Low</td>
<td>DI</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

*APGOVT017 and APGOV018 are control schools.*

The sample contained one school for almost all combinations of variables. For example, APCBSE0013 is a large urban private school, however, it charges low fees, has limited technology, and 50% of its student population are 1st generation learners. APGOV0005 and APGOV0008 are both large rural government schools, but APGOV0005 has relatively good communication and transport links while APGOV0008 is quite remote.
Selected School Data (includes Controls)

The Sample – Teachers

The experimental sample contained 53 teachers, instructing approximately 1,970 students in 5th and 6th English or Science. Teachers ranged from highly experienced, highly qualified and tech savvy to young, lightly qualified and non-tech savvy:

<table>
<thead>
<tr>
<th>ID</th>
<th>School</th>
<th>Eng / Sci</th>
<th>Govt/Priv</th>
<th>Rural/Urban</th>
<th>Gender</th>
<th>Age Group</th>
<th>Tech Savvy Base line</th>
<th>Teacher Quality</th>
<th>Obs Base line Lesson Quality</th>
<th>Year of Exp.</th>
<th>Rep. DI / SC</th>
<th>Obs. DI / SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ap1</td>
<td>APGOVT004</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Med.</td>
<td>11</td>
<td>DI</td>
<td>DI</td>
</tr>
<tr>
<td>ap2</td>
<td>APGOVT002</td>
<td>SCI</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Med.</td>
<td>High</td>
<td>Med.</td>
<td>24</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap3</td>
<td>APGOVT008</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>51-60</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>19</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap4</td>
<td>APGOVT003</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Med.</td>
<td>High</td>
<td>Med.</td>
<td>19</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap5</td>
<td>APGOVT005</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>31-40</td>
<td>High</td>
<td>Med.</td>
<td>Low</td>
<td>6</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap6</td>
<td>APGOVT006</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>31-40</td>
<td>High</td>
<td>Med.</td>
<td>Low</td>
<td>8</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap7</td>
<td>APGOVT002</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Male</td>
<td>41-50</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>18</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap8</td>
<td>APGOVT008</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>19</td>
<td>DI</td>
<td>DI</td>
</tr>
<tr>
<td>ap9</td>
<td>APGOVT001</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>20</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap10</td>
<td>APGOVT006</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>51-60</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>15</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap11</td>
<td>APGOVT010</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>Med.</td>
<td>22</td>
<td>SC</td>
<td>SC</td>
</tr>
<tr>
<td>ap12</td>
<td>APCBSE013</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>Low</td>
<td>Med.</td>
<td>5</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap14</td>
<td>APGOVT001</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>51-60</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>25</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap15</td>
<td>APCBSE013</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>25-30</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>13</td>
<td>SC</td>
<td>SC</td>
</tr>
<tr>
<td>ap16</td>
<td>APGOVT007</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>Med.</td>
<td>High</td>
<td>Low</td>
<td>20</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>ap17</td>
<td>APCBSE014</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>High</td>
<td>Med.</td>
<td>Low</td>
<td>12</td>
<td>SC</td>
<td>SC</td>
</tr>
<tr>
<td>ap18</td>
<td>APCBSE014</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>13</td>
<td>SC</td>
<td>SC</td>
</tr>
<tr>
<td>ap19</td>
<td>APGOVT009</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>25-30</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>6</td>
<td>DI</td>
<td>DI</td>
</tr>
<tr>
<td>ap20</td>
<td>APGOVT009</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>25-30</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td>3</td>
<td>DI</td>
<td>DI</td>
</tr>
<tr>
<td>ap21</td>
<td>APGOVT011</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td>21</td>
<td>SC</td>
<td>DI</td>
</tr>
<tr>
<td>-----</td>
<td>----------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>--------</td>
<td>-----------</td>
<td>---------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>ap22</td>
<td>APOGVT005</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>Med.</td>
<td></td>
<td>20</td>
<td>SC</td>
</tr>
<tr>
<td>ap23</td>
<td>APOGVT011</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td></td>
<td>25</td>
<td>SC</td>
</tr>
<tr>
<td>ap24</td>
<td>APOGVT012</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>Med.</td>
<td></td>
<td>28</td>
<td>SC</td>
</tr>
<tr>
<td>ap25</td>
<td>APCBSE014</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>High</td>
<td>Med.</td>
<td>Med.</td>
<td></td>
<td>6</td>
<td>SC</td>
</tr>
<tr>
<td>ap26</td>
<td>APCBSE014</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>25-30</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>6</td>
<td>SC</td>
</tr>
<tr>
<td>ap27</td>
<td>APOGVT012</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td></td>
<td>18</td>
<td>SC</td>
</tr>
<tr>
<td>ap28</td>
<td>APOGVT004</td>
<td>SCI</td>
<td>Govt</td>
<td>Rural</td>
<td>Female</td>
<td>41-50</td>
<td>Med.</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>15</td>
<td>SC</td>
</tr>
<tr>
<td>ap29</td>
<td>APOGVT010</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td></td>
<td>16</td>
<td>SC</td>
</tr>
<tr>
<td>ap30</td>
<td>APOGVT007</td>
<td>ENG</td>
<td>Govt</td>
<td>Rural</td>
<td>Male</td>
<td>41-50</td>
<td>Med.</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>20</td>
<td>SC</td>
</tr>
<tr>
<td>tn1</td>
<td>TNCBSE015</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>26</td>
<td>SC</td>
</tr>
<tr>
<td>tn2</td>
<td>TNCBSE015</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Med.</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>9</td>
<td>SC</td>
</tr>
<tr>
<td>tn3</td>
<td>TNCBSE016</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td></td>
<td>20</td>
<td>SC</td>
</tr>
<tr>
<td>tn4</td>
<td>TNCBSE016</td>
<td>ENG</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Med.</td>
<td>High</td>
<td>High</td>
<td></td>
<td>18</td>
<td>SC</td>
</tr>
<tr>
<td>tn5</td>
<td>TNCBSE016</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>51-60</td>
<td>Med.</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>20</td>
<td>SC</td>
</tr>
<tr>
<td>tn6</td>
<td>TNCBSE016</td>
<td>SCI</td>
<td>Priv</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>10</td>
<td>SC</td>
</tr>
<tr>
<td>tn7</td>
<td>TNGOV7001</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>30</td>
<td>SC</td>
</tr>
<tr>
<td>tn8</td>
<td>TNGOV7002</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>5</td>
<td>SC</td>
</tr>
<tr>
<td>tn9</td>
<td>TNGOV7003</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>51-60</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>22</td>
<td>SC</td>
</tr>
<tr>
<td>tn10</td>
<td>TNGOV7004</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Med.</td>
<td>Low</td>
<td>Low</td>
<td></td>
<td>15</td>
<td>SC</td>
</tr>
<tr>
<td>tn11</td>
<td>TNGOV7005</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>23</td>
<td>SC</td>
</tr>
<tr>
<td>tn12</td>
<td>TNGOV7006</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Med.</td>
<td>High</td>
<td>High</td>
<td></td>
<td>16</td>
<td>SC</td>
</tr>
<tr>
<td>tn13</td>
<td>TNGOV7007</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>26</td>
<td>SC</td>
</tr>
<tr>
<td>tn14</td>
<td>TNGOV7008</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>25-30</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>7</td>
<td>DI</td>
</tr>
<tr>
<td>tn15</td>
<td>TNGOV7009</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td></td>
<td>21</td>
<td>SC</td>
</tr>
<tr>
<td>tn16</td>
<td>TNGOV7010</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>High</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>8</td>
<td>SC</td>
</tr>
<tr>
<td>tn17</td>
<td>TNGOV7011</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Male</td>
<td>31-40</td>
<td>Low</td>
<td>Med.</td>
<td>Med.</td>
<td></td>
<td>12</td>
<td>SC</td>
</tr>
<tr>
<td>tn18</td>
<td>TNGOV7012</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td></td>
<td>16</td>
<td>SC</td>
</tr>
<tr>
<td>tn19</td>
<td>TNGOV7013</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td></td>
<td>25</td>
<td>SC</td>
</tr>
<tr>
<td>tn20</td>
<td>TNGOV7014</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td></td>
<td>24</td>
<td>SC</td>
</tr>
<tr>
<td>tn21</td>
<td>TNGOV7015</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>31-40</td>
<td>Low</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>19</td>
<td>SC</td>
</tr>
<tr>
<td>tn22</td>
<td>TNGOV7016</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>15</td>
<td>SC</td>
</tr>
<tr>
<td>tn23</td>
<td>TNGOV7017</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>Low</td>
<td>Med.</td>
<td></td>
<td>4</td>
<td>SC</td>
</tr>
<tr>
<td>tn24</td>
<td>TNGOV7018</td>
<td>ENG</td>
<td>Govt</td>
<td>Urban</td>
<td>Female</td>
<td>41-50</td>
<td>Low</td>
<td>High</td>
<td>Med.</td>
<td></td>
<td>19</td>
<td>SC</td>
</tr>
</tbody>
</table>

Note: Teacher ID ap13 was reserved for the second teacher from APOGVT003, who declined to participate.

The sample contained multiple teachers for most combinations of variables. For example, ap19 and tn14 are young male and female teachers with basic credentials and good technology skills, while ap1 and tn24 are older female teachers with strong pedagogy credentials but low technology skills. English was over-represented in the sample due to Chennai Corporation’s choice to implement only for English.
Selected Baseline Teacher Data

**Teachers by Sector**
- Govt: 12
- Priv: 41

**Teachers by Subject**
- ENG: 17
- SCI: 36

**Teachers by Gender**
- Female: 15
- Male: 38

**Teachers by Age**
- 25-30: 5
- 31-40: 5
- 41-50: 14
- 51-60: 29

**Teachers by Tech Savvy**
- High: 22
- Low: 21
- Medium: 10

**Teachers by Qualification**
- High: 25
- Low: 23
- Medium: 5

**Teachers by Reported Style**
- DI: 11
- SC: 42

**Teachers by Observed Style**
- DI: 48
- SC: 5

The vast majority of teachers reported in interview that their teaching style was “student centred”, i.e. they used “student centred” (SC) teaching behaviours more often than “direct instruction” (DI), for example, “students working in small groups – almost always” vs. “ teacher lecturing – sometimes”. During the baseline CRP, EZ Vidya observed most lessons exhibited a majority of DI behaviours.

**Experimental Design & Controls**

BridgeIt India is *quasi-experimental*; schools were not randomly selected. The 5th and 6th English and Science sections of NED teachers formed the *treatment* group. (Most nominated schools had only one teacher in each subject and standard.) Some CBSE schools had more than one English or Science teacher, so that some 5th or 6th sections’ teachers had NED and others did not. Those
sections without NED formed the core of the **control** group. Two nominated but de-selected AP government schools were also used as controls. Due to the delayed start, CC schools did not participate in the full evaluation, leaving 35 experimental teachers’ sections (53 – 18 CC teachers) and 9 control sections, for a total of 44 sections:

<table>
<thead>
<tr>
<th>School</th>
<th>Subject</th>
<th>Std.</th>
<th>Sect.</th>
<th>Type</th>
<th>School</th>
<th>Subject</th>
<th>Std.</th>
<th>Sect.</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>APGOVT001</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>APGOVT002</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT001</td>
<td>Science</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>APGOVT002</td>
<td>Science</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT002</td>
<td>English</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
<td>APGOVT003</td>
<td>English</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT002</td>
<td>Science</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
<td>APGOVT004</td>
<td>Science</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT003</td>
<td>English</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
<td>APGOVT004</td>
<td>English</td>
<td>6</td>
<td>6</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT005</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>APGOVT007</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT005</td>
<td>Science</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
<td>APGOVT008</td>
<td>English</td>
<td>6</td>
<td>6</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT006</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>APCBSE013</td>
<td>English</td>
<td>5</td>
<td>5C</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT006</td>
<td>Science</td>
<td>6</td>
<td>6</td>
<td>NED</td>
<td>TNCBSE015</td>
<td>English</td>
<td>6</td>
<td>6A</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT007</td>
<td>English</td>
<td>6</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>English</td>
<td>6</td>
<td>6B</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT007</td>
<td>Science</td>
<td>6</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE015</td>
<td>Science</td>
<td>5</td>
<td>5E</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT008</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE015</td>
<td>Science</td>
<td>5</td>
<td>5F</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT008</td>
<td>Science</td>
<td>6</td>
<td>6</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>English</td>
<td>5</td>
<td>5B</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT009</td>
<td>English</td>
<td>5</td>
<td>5A</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>English</td>
<td>5</td>
<td>5C</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT009</td>
<td>Science</td>
<td>5</td>
<td>5A</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>English</td>
<td>6</td>
<td>6A</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT10</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>English</td>
<td>6</td>
<td>6B</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT10</td>
<td>Science</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>Science</td>
<td>6</td>
<td>5A</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT11</td>
<td>English</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>Science</td>
<td>6</td>
<td>6B</td>
<td>Control</td>
</tr>
<tr>
<td>APGOVT11</td>
<td>Science</td>
<td>5</td>
<td>5</td>
<td>NED</td>
<td>TNCBSE016</td>
<td>Science</td>
<td>5</td>
<td>6C</td>
<td>NED</td>
</tr>
</tbody>
</table>

The 9 control sections were overweight in private, mid/high profile sections, but otherwise well matched to the 35 experimental sections. The 5 TN CBSE control sections were at the experimental schools, but with different teachers. The 4 AP government sections were at schools scheduled to be enrolled in the project, but de-selected due to lack of mobile phone signal strength (APGOVT018) or because the sample contained too many smaller schools (APGOVT017). Only teacher and treatment effects would apply to variations between the CBSE experimental and control sections (student demographics were homogenous). Teacher, treatment, and some school effects would apply to the government controls, however; APGOVT017 and APGOVT018 matched the treatment schools on the variables captured, e.g. economic profile, size, location, teacher quality, etc.

Given that student socio-economic status is strongly correlated with academic achievement, and that the two AP government schools were relatively strong performers academically, comparing the experimental group to the control is **conservative**. The control group, with 44% medium/high economic profile and 100% high academic achievement sections, would be expected to significantly outperform the 31% medium/high economic profile and 57% high academic achievement section experimental group.

**Evaluation Database**

The Bridgeit India project framework guided evaluation and data gathering. The indicators and proposed means of verification in the framework defined the evaluation database. The core evaluation activities\(^\text{19}\) were as follows:

---

\(^{19}\) Several project activities, for example, “Install, configure, and maintain live NED server”, were required for implementation, but did not form part of the evaluation.
Data Gathering Methodology

EZ Vidya prepared 5 survey instruments and 8 academic tests:

- School Profile (SP)
- Baseline Teacher Profile (TP)
- Classroom Observation Form (CRP)
- Student Focus Group Feedback Form (SFG)
- Endline Teacher Profile (Streamlined version of the Baseline TP)
- 5th & 6th Science Syllabi Topic Written Pre- & Post-Tests (4 total)
- 5th & 6th English Recorded Audio Listening Skills Pre- & Post-Tests (4 total)

Data gathering instruments and sample pre- and post- test papers are included in the appendix.

As soon as a school partner agreed to participate, EZ Vidya field consultants visited each school and met individually with school administration and teachers to collect “Visit Zero” school and teacher specific information. EZ Vidya assigned fluent Telugu (Andhra Pradesh) and Tamil (Tamil Nadu) speakers as needed. This set of data (school and teacher profiles) was used to validate that treatment schools met the minimum requirements for participation – availability of a suitable display device (connectable to the C7, in working condition, 21” or larger screen, clearly audible speaker volume), minimum mobile phone signal strength (3G or Edge reception with at least 3 bars), administrative support (principal was willing to participate and resolve implementation issues if required), and teacher support (teachers were willing to attend training, use NED regularly as part of their normal course of instruction, be observed, and give feedback).
EZ Vidya collated and shared validation data with the partners, and confirmed treatment participants as described in preceding sections. EZ Vidya consultants then re-visited validated schools, re-interviewed principals and teachers as necessary to fill any gaps in the survey data prior to treatment, and observed each teacher conduct a pre-NED lesson (CRP) as a baseline prior to training and phone distribution. Baselining was conducted progressively across Andhra Pradesh and Tamil Nadu from June 2011 to Dec 2011, as schools joined the project (see timeline), completing items a., b., & c. of the evaluation database for all schools.

EZ Vidya also distributed academic tests and trained teachers on the testing protocol during site visits, as follows:

- Science pre-tests were to be administered to students prior to teaching the test topic, and post-test after.
- English pre-tests were to be administered early in the school year, and post-tests at the end.
- All tests were to be “blind”, i.e. students were not to be coached or given answers prior to taking any test, and tests were to be used only to evaluate the programme, not the teacher.
- Students at all schools should have a similar testing experience, with Science tests to be conducted silently and individually in a single class period, and English audio tracks to be played three times and then students to write answers to dictated questions.

Teachers were asked to conduct the tests on their own at appropriate times and mail or store student test papers for EZ Vidya to collect and mark centrally, completing items d. and e. of the evaluation database. Chennai Corporation schools did not administer the tests due to the short treatment period.

EZ Vidya setup the NED server and imaged phones with a common pre-load package (NED software, available videos, EZ Vidya helpdesk contacts, C7 standard apps) prior to training. Phones were distributed to teachers during training, as follows:

- All AP teachers: 28-29 Jul 2011 two-day centralized workshop in Hyderabad
- All TN private school teachers: 7 Sep 2011 one-day workshop in Chennai
- All CC teachers: 10 Feb 2012 one-day workshop in Chennai

Following training, the field team revisited schools to provide on-site support, observe teachers using NED in class (CRPs), and gather qualitative data from teachers and students (SFGs).

\(^{20}\) Note: CRP evaluation was “blind”. Consultants attended calibration training so that forms were filled in consistently, however, field consultants were not told how the data would be evaluated, for example, which fields were positive or negative for lesson quality. But for a few common sense parameters such as “Did the lesson seem to be effective?” consultants recorded only what they directly observed in the class.
completing items f. & g. of the evaluation database for all schools. Consultants visited schools on a rough rotation, designed to provide extensive support in early months, and then tapering off.

<table>
<thead>
<tr>
<th>Planned 10 Site Visit Schedule</th>
<th># of visits</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month 1</td>
<td>2</td>
<td>Baseline</td>
</tr>
<tr>
<td>Month 2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Month 3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Month 4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Month 5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Month 6</td>
<td>1</td>
<td>Midline</td>
</tr>
<tr>
<td>Month 7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Month 8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Month 9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Month 10</td>
<td>1</td>
<td>Endline</td>
</tr>
</tbody>
</table>

This schedule was modified on a need-basis for struggling teachers; schools whose teachers had low usage or who reported problems were visited more often. Site visits were scheduled in advance with teachers so that consultants could observe appropriate class period lessons. EZ Vidya also conducted a centralized one day “refresher” training & feedback workshop for AP teachers in Hyderabad 4 Jan 2012 and on-site workshops for TN CBSE teachers.

Note: CRPs were not possible during all site visits due to power cuts and other unscheduled adjustments to the teaching periods, for example, teachers being called for other duties.

The AP schedule was also affected by the Telengana bandh, as shown below:

Staggered programme start dates also affected the site visit schedule. For example, Chennai Corporation teachers received 4 site visits each during Feb – Apr 2012 vs. only 1 site visit during this period at AP schools. The complete site visit diary is listed in the appendix.

At the end of the school year, EZ Vidya conducted two wrapup sessions, one for AP and one for TN, as follows:

• All AP teachers: 21 Mar 2012 ½-day session in Hyderabad

• All TN teachers: 24 Apr 2012 ½-day session in Chennai

All teachers attended and completed an endline teacher profile survey, item h. in the evaluation database.

EZ Vidya maintained a log of feedback reported during all workshops, site visits, and remote support interactions (phone, email, SMS), item i. in the evaluation database. All comments were included, regardless of subject or tone. Comments were categorized by topic (e.g. content, phone,
pedagogy, etc.) and whether positive, negative, or neutral. The feedback log is included in the appendix.

During validation & baseline, EZ Vidya reviewed published 3G coverage maps, conducted signal strength tests on-site at schools, and surveyed teachers on the signal quality of their personal phone plans. Based on this input, EZ Vidya selected Airtel as the best mobile service provider for Andhra Pradesh and Vodafone for Tamil Nadu. EZ Vidya purchased a set of 30 post-paid SIMs in a “closed user group” (CUG) from each provider, loaded the SIMs in the phones and recorded which teacher had which phone, SIM, and user ID in an asset register. The two plans were roughly similar, with Airtel slightly more expensive for a more generous data allocation, as follows:

<table>
<thead>
<tr>
<th>Provider</th>
<th>State</th>
<th>Base Plan</th>
<th>3G Plan</th>
<th>Total Fixed Monthly Fee</th>
<th>Incl. Min.</th>
<th>Incl. SMS</th>
<th>Incl. Data</th>
<th>Rate per Addl. Minute (Provider/Other)</th>
<th>Rate per SMS</th>
<th>Rate per Addl. 1 Mb data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airtel</td>
<td>AP</td>
<td>Advantage Rs. 199 CUG plan</td>
<td>Rs. 450</td>
<td>Rs. 649</td>
<td>149</td>
<td>All CUG</td>
<td>1200Mb</td>
<td>Rs. 0.50 / 0.60</td>
<td>Rs. 1</td>
<td>Rs. 321</td>
</tr>
<tr>
<td>Vodafone</td>
<td>TN</td>
<td>Talk More 100@lifetime Combo Pack with CUG Clip Rs. 199</td>
<td>Rs. 375</td>
<td>Rs. 574</td>
<td>174</td>
<td>All CUB</td>
<td>500Mb</td>
<td>Rs. 0.49 / 0.99</td>
<td>Rs. 1</td>
<td>Rs. 10</td>
</tr>
</tbody>
</table>

EZ Vidya paid the 30 bills for each provider centrally, and recorded usage details for item j. of the evaluation database each month from the billing records provided by the two companies.

NED 2.0 and later versions contain a feature whereby activity within the application is automatically logged. For example, NED records a log entry when a user plays a media item, updates the catalog, downloads a media item, logs out, or logs in. EZ Vidya set all participants’ phones to push statistics to the server over the 3G network automatically, such that all NED activity was recorded. EZ Vidya downloaded the statistics file at intervals to review teacher usage. The final extract taken on Fri 20 Apr 2012 (containing all NED logs through to the completion of the school year) represents item k. of the evaluation database22.

Prior to the start of the school year, EZ Vidya setup email, voice, and SMS support channels for teachers (helpdesk@ezvidya.com, Voicemail 044 2834 0398 and SMS 87544 67398). All three channels were connected to a custom application23 that recorded inbound service requests in a database. EZ Vidya staff monitored the helpdesk console, tracked service tickets from NOKIA teachers, and logged activity against those tickets. The SQL query selecting all NOKIA tickets from the helpdesk on Fri 20 Apr 2012 represents item l. in the evaluation database.

---

21 Capped charge: after 1.50566Gb 100% free
22 Note: NED only tracks usage via the NED user interface. EZ Vidya observed that some teachers used the C7 File Manager to play videos on the phone without using NED and/or copied and played some videos on a PC via the C7 USB adapter. The NED log is therefore an under-estimate of usage.
23 iPath iAllWays Helpdesk – for more information see http://www.ipathtech.com
**BridgeIt India 2011-12 By The Numbers**

- 34 schools – 12 APREIS, 18 CC, 4 CBSE
- 53 teachers – 24 APREIS, 18 CC, 11 CBSE
- 17 syllabus maps – 4 AP (5th/6th Eng/Sci), 1 TN (5th Eng), 12 CBSE (6 unique Eng and 6 Sci courses)
- 4.2Gb of content – 231 videos with matching Activity Guides (AGs), split 103 English and 128 Science

<table>
<thead>
<tr>
<th>Source</th>
<th># of Videos</th>
<th>% of Catalog</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZ Vidya</td>
<td>77</td>
<td>33%</td>
</tr>
<tr>
<td>Pearson</td>
<td>120</td>
<td>52%</td>
</tr>
<tr>
<td>Non-Commercial / Creative Commons</td>
<td>20</td>
<td>9%</td>
</tr>
<tr>
<td>Public Domain</td>
<td>14</td>
<td>6%</td>
</tr>
</tbody>
</table>

- 224 Site Visits & 169 CRPs
- 16 training sessions
- 2,832 student academic tests (1,453 English and 1,379 Science)
- 71.6 Gb data downloaded & 8,360 videos played
- 261 helpdesk tickets & 327 logged feedback items
- 93,001 voice minutes and 5,986 SMS
Evidence of the Impact of NED

EZ Vidya measured the impact of NED by examining the initial and final conditions for teaching and learning at experimental schools and the control schools in the evaluation database.

Academic Learning Gains

Academic effect, as measured by the pre- and post-test instruments, varied by school sector and by subject:

- NED had a strong, positive, statistically significant effect on Science learning at Government schools – students in NED classrooms improved an average of 9.53% more marks between pre- and post-test than control.
- The NED impact in English and CBSE Science was not statistically significant.

On aggregate, NED classrooms outperformed controls by a large margin, despite control being overweight in higher performing sections:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Control (Change Pre to Post test without NED)</th>
<th>Treatment (Change Pre to Post test with NED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>+11%</td>
<td>+14%</td>
</tr>
<tr>
<td>English</td>
<td>+8%</td>
<td>+18%</td>
</tr>
</tbody>
</table>

However, EZ Vidya discovered during analysis that there was significant variation in the student population from the pre-test to the post-test. For example, APGOVT008 Class 5 had 40 students, but only 33 were identifiable as having taken both the pre- and the post-tests; either students were not present for one of the tests, or they did not identify themselves by the same roll number and name. EZ Vidya also noticed during marking that some teachers had not adhered to the protocol. Students at 2 schools scored 100% on the English post-tests, with uniform answers, implying that the teacher had directed their responses. Teachers for 6 sections of students submitted test papers for only pre- or only post-tests, but not both. In total, EZ Vidya disqualified 8 sections (334 answer papers), as follows:

<table>
<thead>
<tr>
<th>School</th>
<th>Section</th>
<th>Subject</th>
<th>Protocol Error</th>
<th>Section Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>APGOVT001</td>
<td>5</td>
<td>English</td>
<td>100% post-test scores</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT017</td>
<td>6</td>
<td>English</td>
<td>100% post-test scores</td>
<td>Control</td>
</tr>
<tr>
<td>TNCBSE016</td>
<td>6B</td>
<td>Science</td>
<td>Pre-test, No Post</td>
<td>Control</td>
</tr>
<tr>
<td>TNCBSE016</td>
<td>5A</td>
<td>Science</td>
<td>Post-test, No Pre</td>
<td>NED</td>
</tr>
<tr>
<td>APGOVT002</td>
<td>6B</td>
<td>English</td>
<td>Pre-test, No Post</td>
<td>NED</td>
</tr>
<tr>
<td>TNCBSE015</td>
<td>6B</td>
<td>English</td>
<td>Post-test, No Pre</td>
<td>Control</td>
</tr>
<tr>
<td>TNCBSE016</td>
<td>6A</td>
<td>English</td>
<td>Post-test, No Pre</td>
<td>Control</td>
</tr>
<tr>
<td>TNCBSE016</td>
<td>5B</td>
<td>English</td>
<td>Post-test, No Pre</td>
<td>Control</td>
</tr>
</tbody>
</table>

2,498 answer papers in 32 of 35 experimental and 4 of 9 control sections were marked as valid (i.e. followed protocol), implying a maximum of 1,249 unique students could have taken both pre- and post-tests. EZ Vidya was able to match the pre- and post-test scores of 771 students (337 English and 434 Science). EZ Vidya then calculated the difference (delta) between pre- and post-test by student and subject. The mean and standard deviation of the deltas are shown below:

<table>
<thead>
<tr>
<th></th>
<th>Mean Delta (Control)</th>
<th>Mean Delta (NED)</th>
<th># of Obs (Control)</th>
<th># of Obs (NED)</th>
<th>StDev (Control)</th>
<th>StDev (NED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govt English</td>
<td>10.71%</td>
<td>8.43%</td>
<td>26</td>
<td>217</td>
<td>0.127</td>
<td>0.276</td>
</tr>
<tr>
<td>CBSE English</td>
<td>no data</td>
<td>-10.35%</td>
<td>0</td>
<td>94</td>
<td>no data</td>
<td>0.256</td>
</tr>
</tbody>
</table>

24 During CRPs, EZ Vidya observed an average class size of 32 students. The number of observations (# of Obs) corresponds to one valid section of Govt English control, zero sections of CBSE English control, two sections of Govt Science control, and one section of CBSE Science control.
Similar to the evaluation of the Philippines Text2Teach NED project, EZ Vidya assessed the effect of the intervention to improve learning gains using a paired t-test\(^{25}\), comparing each child’s score at pre- and post-test, where learning gain is defined as the difference between post and pre-test score.

EZ Vidya hypothesized that regular use of NED in the classroom, with appropriate content, would produce significant learning gains for students across all types of Indian schools, with “at risk” students benefiting the most. For evaluation, the null hypothesis is therefore that pre- to post-change in NED classes would be statistically the same as in control classes, i.e. Mean[delta]control = Mean[delta]NED. The alternative hypothesis is that pre- to post-change in NED classes will be more than in control classes, with greater change likelier in lower profile (Govt) schools, i.e. Mean[delta]control < Mean[delta]NED. With alpha = 0.05 (95% confidence), EZ Vidya finds the null hypothesis can be convincingly rejected for Govt Science students. In other words, the strong positive effect of NED, where NED students scores improved by roughly 10% more marks than controls, can be attributed to NED with a high degree of confidence. Other effects (Science in higher profile CBSE schools and English at all schools) are not significant, as shown in the table:

<table>
<thead>
<tr>
<th></th>
<th>t-Test Value</th>
<th>P-Value</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Govt English</td>
<td>-0.730571273</td>
<td>0.554</td>
<td>not significant, null hypothesis cannot be rejected</td>
</tr>
<tr>
<td>CBSE English</td>
<td>No Data</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Govt Science</td>
<td>3.974374989</td>
<td>0.999</td>
<td>strongly significant, reject null hypothesis</td>
</tr>
<tr>
<td>CBSE Science</td>
<td>-1.776144276</td>
<td>0.921</td>
<td>significant at alpha = 0.10, not significant at alpha = 0.05, null hypothesis cannot be rejected</td>
</tr>
</tbody>
</table>

As expected, students in the control schools outperformed students in the NED schools in absolute terms – controls were high academic performers, higher economic profiles, or both. Most sections of students showed large learning gains from instruction. (Unsurprisingly, kids performed better after being taught.) However, for Govt Science students at low academic achievement schools, NED was an equalizer, lifting average post-test scores from a lower base to levels similar to high academically achieving schools.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Subject</th>
<th>Pre-Test Mean Marks</th>
<th>Post-Test Mean Marks</th>
<th>Pre-Test Mean Marks</th>
<th>Post-Test Mean Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBSE</td>
<td>Science</td>
<td>67%</td>
<td>87%</td>
<td>68%</td>
<td>79%</td>
</tr>
<tr>
<td>Govt</td>
<td>Science</td>
<td>56%</td>
<td>62%</td>
<td>44%</td>
<td>60%</td>
</tr>
<tr>
<td>CBSE</td>
<td>English</td>
<td>no data</td>
<td>no data</td>
<td>72%</td>
<td>61%</td>
</tr>
<tr>
<td>Govt</td>
<td>English</td>
<td>75%</td>
<td>85%</td>
<td>54%</td>
<td>62%</td>
</tr>
</tbody>
</table>

Teachers recognized the impact in Science:

“Certainly Bridget has created an impact pertaining to science, and with regard to AVs [I feel] more content related to the syllabus is given in detail.” – tn2

Four factors potentially explain why NED had a much weaker effect for English sections than for Science:

1. Science concepts mapped better – videos had a much better alignment to Science topics than English;
2. Less content – English had less videos per syllabi;

\(^{25}\) t-test = (Mean Score of Treatment - Mean Score of Control) / Square root of (VarianceT/nT + VarianceC/nC)
3. Strong negative feedback by teachers on using Pearson Foundation American accented English content in class;

4. EZ Vidya observed a larger change in teaching methods during CRPs among Science teachers than English.

Both Science and English teachers demonstrated a strong preference for strictly following the textbook treatment of each topic. 44% of baseline CRPs featured teachers reading directly from the textbook.

While preparing the 17 syllabi maps, EZ Vidya noticed that Science topics mapped much more closely to and across textbooks than English. Science concepts such as photosynthesis or the human body varied little from textbook to textbook, however, English passages were widely divergent. EZ Vidya was able to match or re-use a given video across an average of 1.9 out of 9 English syllabi, vs. 3.2 out of 8 Science syllabi. English teachers consistently complained about the alignment of the content to their syllabus, and the pronunciation used in the videos. 28% of all teacher feedback was on content. 39% of the content feedback was negative, mostly regarding accent. 40% (25 out of 62) of negative or neutral content comments specifically mentioned accent or difficulty following the language. Science teachers were more positive. 64% of Science teacher content feedback was neutral or positive, vs. 57% by English teachers. Representative feedback:

“Pronunciation is difficult for the children to understand because it is purely American accent.” –ap1

“Lesson plan and material are not enough, e.g. video and audio comes in US & UK English. Please follow Indian English” –ap19

“The programme will be better if the content is aligned to the text book, work and supplementary reader” –ap23

“Clippings/ AVs should be related to content or text in the book.” –ap7

“Pronunciation became very problem.” –ap8

“The programme is somewhat irrelevant for the English subject as it does not correlate to the lessons/content in the text book, supplementary [reader] and work book. AGs should be prepared according to LSRW. Simple language and easy to understand accent can be used to have better impact on the students.” –ap8

“To include more interesting videos for English like Science” –tn1

“Please give more videos, pictures & materials. Change voice over into Indian voice.” –tn11

“Want more videos & materials related to our syllabus, Don’t want American accent” –tn13

“The accent is difficult for students to understand.” –ap10

“Indianised lessons circumstances, situations, material, accents are more feasible to our village background and mostly to first generation students” –ap11

“I am suggesting please prepare content according to our state syllabus with local accent: 1.Syllabus according to state syllabus 2.Accent 3.Content should be divided class wise.” –ap16

“The students come from Telugu medium schools, teaching subject and recapitulation itself is difficult. So we need complete syllabus along with extra information. The accent of the lessons should be changed.” -ap2

“Content not match the lesson plan – the language of explanation (american english)” –ap20

“Prepare according to syllabus, Complete cover of syllabus, Language is not followed the students” –ap21

“Language is difficult to follow by the 5th class students” –ap28

“Language and accents are very difficult for the students to understand.” –ap9
Student Engagement

NED had a strong positive effect on student engagement, as measured by CRPs, SFGs, and qualitative teacher feedback:

- 98% (93 out of 95 comments) of teacher feedback on student engagement was positive, with no negative feedback on student engagement;
- Students were observed to be significantly more participative in NED lessons vs baseline (pre-NED);
- Teachers reported strong positive attendance effects, especially among gypsy and migrant populations with historically bad attendance.

With NED, the proportion of passive students dropped and the proportion of enthusiastic students increased:

---

26 NED 2.1, released halfway through the project and deployed immediately by EZ Vidya to all teachers, significantly improved the video controls.
### Instructional Delivery

NED had a strong, positive, and statistically significant effect on teaching, as measured by CRP indicators. Lesson quality went up and traditional lecture-style teaching went down. Quality improved dramatically across both subjects. Overall teaching style changed from net direct instruction (DI) to student-centred (SC). Aggregate improvement is shown below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-NED</th>
<th>Post-NED</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of Lessons Rated as “High” Quality</td>
<td>43% (23/54)</td>
<td>74% (84/115)</td>
<td>+31%</td>
</tr>
<tr>
<td>Proportion of Lessons Rated as “DI”</td>
<td>74% (40/54)</td>
<td>50% (58/115)</td>
<td>-24%</td>
</tr>
</tbody>
</table>

Comparing lessons before and after treatment, NED teachers demonstrated an average of 2.29 more indicators of good teaching, and average of 1.66 more net indicators of SC behaviour, changing the typical lesson from DI to neutral (balance of DI and SC).
It’s important to note that, prior to the intervention, all schools had computers. Despite these resources, and teachers self-reporting as keen on AVs, only two (4%) of pre-NED lessons incorporated technology. Besides an increase in the use of technology, dramatic changes were seen in the frequency of teachers:

- Use of lecture teaching method, from 70% of pre-NED lessons to 36% of post-NED;
- Overall teacher talk-time, from 76% to 66% of the period;
- Reading from the textbook, from 44% of pre-NED lessons to 14% post-NED;
- Prompting students to reflect on their thinking, from 33% to 56%;
- Asking students to work in pairs or small groups, from 11% to 28%.

The effect was stronger among teachers who experienced NED longer, and stronger in Science than in English:

<table>
<thead>
<tr>
<th>Teacher Group</th>
<th>Higher value = Better Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of Net Expertise</td>
<td>Post-NED</td>
</tr>
<tr>
<td>All Teachers</td>
<td>14.3</td>
</tr>
<tr>
<td>AP and CBSE TN only (Larger Treatment)</td>
<td>14.2</td>
</tr>
<tr>
<td>CC TN only (Light Treatment – English only)</td>
<td>14.6</td>
</tr>
<tr>
<td>Science Only</td>
<td>15.8</td>
</tr>
<tr>
<td>English Only</td>
<td>13.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Group</th>
<th>Positive = DI, Negative = SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of Net Direct Instruction</td>
<td>Post-NED</td>
</tr>
<tr>
<td>All Teachers</td>
<td>0.1</td>
</tr>
<tr>
<td>AP and CBSE TN only (Larger Treatment)</td>
<td>0.0</td>
</tr>
<tr>
<td>CC TN only (Light Treatment – English only)</td>
<td>0.3</td>
</tr>
<tr>
<td>Science Only</td>
<td>0.2</td>
</tr>
<tr>
<td>English Only</td>
<td>0.1</td>
</tr>
</tbody>
</table>

During baseline interviews, all principals and 83% of teachers expressed a preference for SC instructional strategies – high student participation, group work and relatively little lecture. Teachers’ baseline personal development objectives concentrated on collaborative learning, innovative teaching strategies and incorporating technology. However, 74% of observed baseline lessons were traditional DI, 89% were whole group instruction, and only 4% incorporated technology. In other words, before NED, teachers were motivated to teach in a student-centred way but mainly did not. Through NED, they either learned new strategies or applied previously known strategies more effectively. Put simply, NED gave teachers the means to achieve their goals.

As per the learning gain analysis, EZ Vidya assessed the effect of the intervention to improve teaching using a t-test. Teaching change is measured as the difference between the number of indicators observed pre and post, with the null hypothesis that post-NED lessons would be the same as pre-NED lessons, and the alternative hypothesis that post-NED lessons would be better. The mean and standard deviation of the lesson indicators are shown below:

<table>
<thead>
<tr>
<th>Mean Net DI (Pre-NED)</th>
<th>Mean Net DI (Post-NED)</th>
<th>Std. Dev Net DI (Pre-NED)</th>
<th>Std. Dev Net DI (Post-NED)</th>
<th># of Obs (Pre-NED)</th>
<th># of Obs (Post-NED)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.056</td>
<td>0.398</td>
<td>3.129</td>
<td>3.307</td>
<td>54</td>
<td>115</td>
</tr>
</tbody>
</table>

---

27 Government schools benefitted from digital learning projects and government connectivity initiatives. High profile schools in the sample had substantial school technology, with multiple computer labs and equipment for teachers from primary up. The medium profile private schools have more limited technology, reserved for upper class teachers.
With alpha = 0.05 (95% confidence), EZ Vidya finds the null hypothesis can be convincingly rejected. In other words, teaching improvement can be attributed to NED with a high degree of confidence. Effects are large and significant, as shown in the table:

<table>
<thead>
<tr>
<th></th>
<th>t-Test value</th>
<th>P-Value</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Lesson Quality</td>
<td>2.525784599</td>
<td>0.9926</td>
<td>strongly significant, reject null hypothesis</td>
</tr>
<tr>
<td>(Expertise Improvement)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in Lesson Style</td>
<td>3.679270432</td>
<td>0.9997</td>
<td>strongly significant, reject null hypothesis</td>
</tr>
<tr>
<td>(DI to SC)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teachers recognized the impact of NED on their teaching:

“Bridgeit India has changed my teaching & the teaching has become more interesting than previously.” – ap14

“NED has helped develop the various teaching skills of the teacher.” – ap27

“Avoided lecturing method, use of technology has improved and [students] express themselves very outwardly.” – tn9

### Sustainable Models

A key element of the evaluation was to test whether the intervention could be self-sustaining – as outside supports such as on-site support or external funding are removed, will teachers continue to use the technology and new pedagogy on their own so that students continue to benefit? EZ Vidya evaluated sustainable models in Year 1 using the following parameters, derived from the project framework:

- Willingness of teachers to use of NED as part of regular teaching activity and of partners to support and expand the project;
- Relative value in terms of usage per unit cost;
- Viability of alternative (lower cost) support models in maintaining successful independent usage by teachers;
- Barriers to scale, at both the project and school demographic levels.

### Self-Sustainable Usage

The willingness to use and expand NED was overwhelming:

- 76% (246 / 327) of qualitative feedback was positive or neutral – of the 24% negative, roughly half was related to content, not technology;
- Government partners agreed to expand their Year 2 implementation significantly on conclusion of Year 1, from 30 schools to 90;
- School partners increased their financial contribution to the program from roughly 10% of the project to 30%, purchasing additional school equipment and allocating government staff for site visits and support;
- TN CBSE schools doubled their number of participating teachers, purchasing classroom displays and additional handsets at market rates.

All teachers used NED during the project. In general, teachers found the phone easy to use. Only two teachers (ap7 & ap8) opted to abandon teaching with NED mid-way; both stopped using technology completely.
Relative Value & Teacher Empowerment

Teachers used NED more regularly and students experienced academic gains at a lower cost relative to the dominant technology alternative of a PC lab:

<table>
<thead>
<tr>
<th>Component</th>
<th>NED</th>
<th>PC Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>Rs. 42,000 (C7 handset, cables, display, software, portion of server cost)</td>
<td>Rs. 1,92,000 (10 low cost desktop PCs, cables, low cost projector, software)</td>
</tr>
<tr>
<td>Internet Access</td>
<td>Rs. 4,80028</td>
<td>Rs. 12,000 (DSL or 3G Dongle annual rental)</td>
</tr>
<tr>
<td>Training &amp; Support</td>
<td>Rs. 36,000</td>
<td>Rs. 6,000 (training only, no on-site support)</td>
</tr>
<tr>
<td>Total Cost29</td>
<td>Rs. 72,800</td>
<td>Rs. 2,10,000</td>
</tr>
<tr>
<td>Observed Usage</td>
<td>High – Average of 25 videos per month, timetabled for 2 times per week</td>
<td>Low – 5th and 6th standard teachers hardly used the labs</td>
</tr>
<tr>
<td>Durability</td>
<td>High – no faults, 1 lost teacher phone out of 53 deployed</td>
<td>Medium – most computers &gt; 2 years old were functioning, but often compromised by viruses or physical damage</td>
</tr>
</tbody>
</table>

EZ Vidya was not able to obtain accurate quantitative data on computer lab usage. Field observations and feedback strongly indicate that NED was much better value. All schools had some computers prior to NED and 34% of teachers (18 / 53) reported having received some form of computer training. Still, usage by teachers was extremely low, e.g. 4% of baseline lesson observations. Teachers reported extensive difficulty in using computers due to hardware faults, viruses, lack of training, anxiety, power fluctuations, or exclusive scheduling of the computer resources for upper classes. EZ Vidya visited a number of schools where new computer equipment, including generators, was still in original boxes, uninstalled.

EZ Vidya field staff helped repair or install non-NED technology at APGOVT002, APGOVT004, APGOVT007, APGOVT009 and APCBSE013 while on-site. In contrast, phone technology was uniquely empowering. Representative teacher feedback:

“I would like to use NED more often as it is not taking more pain (efforts) and time. The small mobile phone (C7) with NED has changed my view about using ICT in classroom. Through this simple phone / mobile technology me and my students are enjoying both teaching and learning. More important, I can easily manage without others help. It gives me some satisfaction about my transformation from old to new” –ap25.

28 Average billed phone & 3G usage was Rs. 7,200, however, data indicates that a Rs. 400 per month capped 2G plan will suffice.
29 Cost does not include project framework development, content development, or evaluation.
“Initially I was very scared of handling technology and now I have gained not only the skill of handling it but also proud that I am able to use it in classroom in a different way making both teaching and learning effective.” –tn6

**Alternative Support Models**

EZ Vidya planned for up to 10 site visits per school as needed for support and evaluation. EZ Vidya attempted to minimize site visits without compromising usage in order to maximize scalability. EZ Vidya ensured that all schools were visited a minimum of three times (baseline, midline, and endline). Schools whose teachers reported problems, had doubts about the program, or seemed not to be using NED effectively were visited more often. Experimental schools received a minimum of 4 visits and an average of 6.4 visits. All visits were scheduled in advance, typically with 48 hours notice. The “magic number” of site visits to achieve independence appears to be five (5). Almost all schools experienced a similar pattern of teacher reactions over the course of the site visits:

<table>
<thead>
<tr>
<th>Visit</th>
<th>Teacher Reaction to Site Visit Notification</th>
<th>Visit Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Baseline</td>
<td>“Oh!”</td>
<td>Teachers, although oriented and notified, were not sure of the actual project and what they should do.</td>
</tr>
<tr>
<td>2 – Initial Support</td>
<td>“I'm not ready.”</td>
<td>Following training, teachers were not prepared for someone to observe them teach or actually try to use NED in real classroom conditions</td>
</tr>
<tr>
<td>3 – Potemkin Village</td>
<td>“OK, I'll prepare a lesson”</td>
<td>Teachers were expecting to be observed, but often appeared to re-teach students content used in a previous session (when observers had not been present)</td>
</tr>
<tr>
<td>4 – Emerging Confidence</td>
<td>“When are you coming?”</td>
<td>Teachers were comfortable using “unrehearsed” NED content in front of observers, and often requested observation of a specific period or topic</td>
</tr>
<tr>
<td>5 – Independence</td>
<td>“Come any time.”</td>
<td>Teachers used NED regularly on their own, and were happy to be observed on any lesson, with or without NED</td>
</tr>
</tbody>
</table>

During the project, EZ Vidya observed four natural support experiments:

1. Peer support variation – One, two, or many NED teachers at a school, such that some teachers could turn to multiple peers for support while others could not;
2. Usage either side of idle periods – extended school holidays and Telengana bandh in Andhra Pradesh closing schools;
3. Variable time gaps between visits – Short gaps between training and visits to easily accessible AP schools vs. longer gaps for some rural, hard-to-access schools;
4. Variable support intensity – rapid and intensive support “laps” for Chennai Corporation due to truncated treatment period compared to AP.

The experiments on alternative support models indicated that:

- Peer support is not an important factor. All solo teachers used NED regularly on their own. Teachers in pairs or larger groups often had divergent experiences, with one teacher at a school using NED heavily and another much less. This indicates that the barrier is not
related to the technology; devices, signal, and displays worked the same for all teachers at a school and struggling teachers had access to someone who knew how to use NED well. Rather, teachers’ individual attributes, such as willingness to change teaching methods, dominated.

• “Outbound” remote support is effective. Usage can be sustained across idle periods, and without on-site support. The 1:1 phone model, where each teacher has a unique contact number, provided an extremely valuable remote access channel. While email and web access were not viable, with 38% of teachers reporting using email “Rarely or Never”, EZ Vidya was able to maintain teacher enthusiasm via phone and SMS outreach during school closings, such that usage increased after extended breaks.

• “Inbound” remote support is not very effective. Teachers contacted EZ Vidya with 159 requests (out of 261 total support tickets), or an average of 3 tickets per teacher. However, EZ Vidya consultants discovered and solved many more issues during site visits or by contacting teachers outbound via the phone.

• Contact via remote support sustains usage across idle periods but remote support is not sufficient to begin with – face-to-face is necessary to kick-start usage. Teachers did not progress in usage on their own without site visits. There appeared to be a minimum level of confidence or intervention credibility that was only attained via face-to-face interaction.

• Length of the time gap between initial site visits had a large impact on the speed at which teachers achieved confident, independent usage. Minimizing the time between training / phone distribution and first site visit is especially crucial – schools which received immediate follow up got up to speed faster.

• Once teachers began to use regularly, they kept at it, and once users were “up and running”, long gaps did not appear to affect usage. For example, AP schools received minimal site visits in January and February, but usage continued to rise.

• The intensity of the initial visits is more important than the overall number of visits – multiple visits with short gaps at the start had a dramatic impact on the usage patterns, with intense support laps in CC translating into extremely high usage levels.

• Usage patterns confirm that a 5 site visit model is effective. The most effective pattern appears to be baseline visit and training immediately followed by 3 intense on-site support “laps” spaced by 2-3 weeks.30

The graphs below show number of site visits and volume of media played in NED by month for each state. November and January in AP illustrate self-sustaining usage –usage reached more than 300 media items in November following the September & October bandh even though EZ Vidya did not visit all 14 schools (only 9 site visits), and usage continued to grow in January and December as site visits declined.

---

30 Note: Despite variation in service models, all schools eventually reached the target of 2 NED experiences per week.
The TN graph illustrates the benefits of intense and immediate support. CBSE schools had heavy media usage in September and October following support visits in August, and Chennai Corporation schools responded dramatically to the three rapid laps of support with massive usage in January and February.

The number of site visits does not correlate with media usage. In other words, there isn’t a strong relationship between receiving or not receiving a site visit and NED usage. This is unsurprising – EZ Vidya specifically targeted schools not using NED well for extra visits.
Barriers to Scale

Evaluation specifically targeted multiple states and types of schools, teachers, and students in order to identify conditions particular to a demographic that would inhibit scaling up. EZ Vidya found that:

- NED usage was most successful at lower profile, government schools, with better usage and better outcomes for students. Students who started off at lower proficiency levels appeared to benefit more.

- Teacher and manager attitudes appear to be a major and important determinant of success. TN Govt, AP Govt, and TN CBSE management monitored and strongly backed the project, and teachers responded well. Management at AP CBSE schools were relatively “hands-off”; teachers at these two schools required much more support to use NED\(^{31}\).

- Individual teacher preferences were much more important than school factors, or even fundamental factors like presence of a working TV! Teachers at the same school had very different experiences and feedback, with some teachers finding reasons not to use NED that were directly rebutted by the experience of their colleagues. Students were uniformly positive about NED and clamored for more AV content, yet a small number of teachers essentially couldn’t be bothered to change the way they taught. As observed in the baseline CRPs, initial teaching practice was extremely “traditional”, with heavy emphasis on lecture. Teachers talked an average of 76% of the lesson period and spent 88% of lesson time in “whole class instruction”, as opposed to interacting with individual students or small groups. Despite indicating in surveys that they wanted to change, teachers were extremely comfortable in this mode of teaching during the baseline (71% of lessons were effective) and students were extremely well behaved despite dry lesson treatments. This indicates that strong motivation was required for change.

- Differing language course syllabi, combined with teachers strong and repeatedly stated preference for material directly aligned to their particular textbook, was a major barrier to scale across schools, states, and school boards. English books were idiosyncratic, in that each state government’s book had very different reading selections and grammar activities. EZ Vidya planned for 3 English “streams” or pacing charts (AP Govt, TN Govt, CBSE), however, each CBSE school in the programme used a different textbook and required a separate division of syllabus. This resulted in extensive unbudgeted content work, creating new content to fill in gaps between the Pearson Foundation core content and the particular stories and treatments of each CBSE school’s book. EZ Vidya tried to mitigate the “syllabi difference barrier” by creating more content on LSRW and grammar (topics universal to all English syllabi). Even with this work, English teachers consistently asked for more custom content (i.e. AVs specific to their unique book). Scalability is therefore enhanced by adding

\(^{31}\) Interestingly, despite initial “unsuccess” and lack of oversight, by the end of the school year the APCBSE014 Science teachers had become extremely motivated and were very reluctant to exit the programme.
larger numbers of schools within a smaller number of consistent syllabi, for example, adding more AP Govt schools or more TN Govt schools, and reduced by adding schools or states with different textbooks. It is important to note that commercial Indian education content providers have tried to mitigate the syllabi difference barrier by producing a large number of relatively universal concept videos, and then mapping appropriate sets of these videos to specific books. EZ Vidyा has observed in other projects that this technique is effective for sales but not for usage, as teachers demanded closer mapping of this content as well. In other words, it’s possible to satisfy school management with long lists of topics, but teachers demand micro-level customization, consistent with the NED experience.

- Scalability is also enhanced by adding subjects with consistent sets of topics, and reduced by adding subjects whose treatment is likely to vary across school boards. For example, Social Studies content typically varies according to local political influence, while Mathematics does not. Science topics were relatively stable across syllabi and books, and there was a corresponding benefit in the academic impact evaluation.

- The experience in Tamil Nadu with Samacheer Kalvi also showed that new governments like to meddle with the books, so, content needs to be relatively simple and cheap to produce. On the one hand, teachers were quite happy with relatively low-budget content from EZ Vidyा (creating quickly using internal resources or “open source”), as long as it was well tailored to their books. On the other hand, government textbooks change relatively frequently, affecting cost. Both AP and TN are changing their 6th standard textbooks for 2012-13.

- Year 1 focused only on English-medium instruction. Syllabi as a barrier to scalability will be aggravated by deploying in multiple languages, as each language will likely require different content in addition to the need to translate existing videos.

- Objective teacher characteristics were no predictor of success. Age, gender, years of teaching experience, qualifications, tech savvy, and observed lesson quality had no correlation to amount of NED usage or student achievement delta. Teachers of all ages and skills levels took to NED. Low tech-savvy teachers used NED as much and in many cases more than high tech-savvy teachers.

- The technology endowment of a school was no indicator of viability for NED, rather, what seems to be important is the technology usage pattern for teachers in the target grades. In primary grades, technology resources were commonly reserved (sequestered) for higher grades; teachers at the relatively high tech CBSE schools in TN used NED well in part because they customarily did not use the schools’ computers.

- Convenient access to the phone was a key factor for usage, access to the display less so. Access had four components: equipment in working order, availability of the display / AV room, availability of the phone, and ease of setup.
Phones were remarkably robust – no phone had hardware problems during Year 1.

All schools showed working displays during validation, but teachers were not always able to use them once phones were distributed. Several LCD projectors required new sets of cables or developed hardware faults. For example, APGOVT009 tested NED on a TV at the school during validation, but teachers were later swapped to a KYAN projector – EZ Vidya subsequently repaired the projector on-site in November. Late in the year, APCBSE013 shifted their validated LCD projector to upper classes and installed an incompatible 36” TV in the 5th standard library, ending the project.

Teachers were incredibly creative in solving display access problems, and were remarkably adaptable at using NED despite power cuts. Most schools experienced 2 hour or longer power cuts on a regular basis. Teachers routinely (and unsuccessfully) swapped periods with others so that they could teach their planned NED lesson when power returned. Teachers also found alternative ways for students to experience NED when displays were broken. Ap19 & ap20 at APGOVT009 coped until their projector was repaired by copying videos broadcast to the phone onto a PC via the USB adapter and playing them on the PC monitor. EZ Vidya also repeatedly observed teachers playing videos directly on the handset with small groups when the TV was not available. For example, three groups of students worked on an exercise while the teacher showed a video to a fourth group, then groups rotated.

Shifting the class to an AV room does not appear to be a problem. Several teachers initially reported difficulty in scheduling and taking their class to an AV room, and had slow progression in usage, however, as teachers became more comfortable with NED these complaints stopped and schools successfully timetabled NED sessions, with some schools organizing additional displays. This suggests that “moving to another room” is mainly an excuse not to use NED and that this barrier is soft and can be overcome through proper motivation.

Ease of setup was a major factor. It is easier to connect the phone to a TV than to an LCD projector, especially if the LCD is overhead mounted, as in APCBSE014. Teachers at schools with TVs logged much more NED usage.

Phones should be in teachers’ hands. An administrator at APCBSE013 kept phones locked in their office and issued them to teachers the afternoon before teachers requested to use NED in class. The APCBSE013 teachers (ap12 & ap15) were extremely unmotivated and NED had almost no impact at their school.

The 1:1 model with a relatively expensive phone (each teacher gets their own C7) had significant positive effects on teacher empowerment and motivation. Outreach was vital for identifying problems and sustaining enthusiasm. The 1:1 model made it extremely easy to contact each teacher directly. Personal possession of a sophisticated (as opposed to budget) phone model was important – teachers reported being proud to have the phone and enjoyed both having the phone and the status associated with it. Teachers repeatedly asked for assurance during the end-of-year wrapup session that they would get the phone back in Year 2! Strong motivation was required to change teaching practice – the higher-end phone served as an excellent motivator, and a “Trojan horse” for change. The smooth, high-end touch screen response was also a significant factor. Only 2 teachers previously had

---

32 Four teachers corrupted their phone software, either by accidentally performing a factory reset or by copying or deleting files inappropriately using the USB adapter, in violation of their teacher phone agreement. EZ Vidya swapped these phones for loaner units and reconfigured them, as teachers were unable to successfully re-install NED from an SMS or UIRL remotely.
touch screen phones, yet teachers easily learned how to operate the C7. There was no negative feedback about the phone itself, except for one comment about the phone heating up in use. Finally, the 1:1 model allowed teachers to use the phone features to prepare for lessons at their convenience. Teachers watched videos at home on the phone to choose content and plan their lessons. Teachers took photographs and videos with the phone camera or downloaded content from Youtube outside of school onto the phone and used this content in class. For example, tn2 paired outside content on tsunamis and earthquakes with Pearson Foundation material for her Science lesson on natural disasters.

“Simple instrument (phone) changed my self and students and classroom. It is easy to use. Whenever I am free I can check my lessons and prepare.” – ap24

- Interestingly, EZ Vidya observed a simple natural experiment between 1:1 model (each teacher has a phone) and a shared model (multiple teachers use the same phone). 1 English teacher (ap14) lost her phone in November and was asked to share access with her Science teacher colleague (ap9). The NED log for the ap9 user account shows low but significant ENG media playback, proving that the English and Science teachers successfully shared the phone, similar to the shared phone model used in the Philippines.

<table>
<thead>
<tr>
<th>Month</th>
<th>ENG</th>
<th>SCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>Jan</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Feb</td>
<td>28</td>
<td>43</td>
</tr>
</tbody>
</table>

- Intensity of evaluation can be a barrier to scale. As described in the support model section, teachers were not particularly forthcoming about their problems over the phone, and needed several site visits to “let down their guard”33. Lesson observation increased the number of site visits required, as CRPs were often postponed34. EZ Vidya was able to conduct CRPs in 74% of site visits, roughly 3 out of 4 visits, despite scheduling visits in advance. In other words, the more data to collect, the more face-to-face contact is required, which can significantly increase cost and therefore reduce the reach for an equivalent budget.

- High phone charges are a potential barrier. Several teachers incurred excess charges due to personal use, which schools are unlikely to pay. Teachers were asked to stay within a cap on data and calling, and signed an agreement limiting their usage. EZ Vidya intentionally left the phone plans uncapped to discover what actual usage levels would be, to encourage teachers to download more content and use Internet services, and to minimize any disruptions of new content downloads. EZ Vidya typically uploaded 6 new videos to the

---

33 During the initial teacher orientation sessions, attended by school management, teachers were careful to make statements closely aligned to their management’s goals. Their written feedback aligned well with “ideal” and was different from what was subsequently observed. Trust appeared to be low. Over time, teachers became surprisingly frank. Teachers also invested warmly in their relationship with the programme and the EZ Vidya consultant with whom they interacted the most, to the point where it was hard to conduct a conference call for AP teachers because they were so excited to hear from and greet the various members of EZ Vidya’s field team.

34 Reasons for postponement changed over time. At first, many teachers appeared to be avoiding observation. For example, consultants would arrive on-site as scheduled and teachers would not be prepared to teach a lesson, or some event at school would make a lesson observation impractical. This lessened as teachers’ comfort level increased. Even without avoidance, schedules at all schools were often disrupted by power cuts, school functions such as Annual Day, special revision sessions, or other events that required sudden re-allocations of teachers or students.
server each week, with an average video size of 18.2Mb for an average monthly new upload of 436Mb. Teachers downloaded 203Mb on average per month, consistent with their subject split (436 ÷ 2 = 218), however, 5 users (ap19, ap20, ap30, tn14, and tn18) averaged more than 500Mb per month. Total monthly data usage by individual teachers exceeded 1Gb 11 times (max of 2.1Gb by ap19). With a 500Gb or 1Gb cap, these teachers would have experienced download disruptions, justifying the decision to keep plans uncapped. However, some teachers dishonoured their phone agreements and incurred charges for personal calls, game downloads, or international SMS. Bills exceeded the budgeted Rs. 950 per month 80 times. EZ Vidya monitored bills closely, and notified teachers reaching the Rs. 950 threshold each month, however, phone or SMS reminders on usage did not seem to deter offending teachers from running up high bills in subsequent months. 12 teachers exceeded Rs. 950 three or more times during the programme. Since the bulk of the phone billing was fixed monthly charges for 3G data, this cost can be significantly reduced by a 2G plan with a data cap.

- Access to 3G networks is not a barrier to scale. Despite advertising widespread 3G coverage, and phones reporting “3G” or 3.5G on signal strength indicators during validation, teachers mainly experienced 2G speed. Teachers initially complained that download speed at their schools was slow, however, these comments stopped after the NED 2.1 update improved download efficiency. EZ Vidya conducted several tests in city centres (Hyderabad, Chennai, and Bangalore) where 3G coverage was expected to be strong. Despite indicating 3G, identical phones with 3G and 2G data plans downloaded the same NED content at almost identical rates. NED performance was quite acceptable via 2G networks, indicating that usage can delivered significantly cheaper using 2G plans (1Gb data plus talk time and SMS available for Rs. 400 per month in most circles.)

- Teaching practice remains stubbornly “traditional”. Even with a significant shift in teaching methods, most classes are still dominated by the teachers’ voices (66% teacher talk time) and instruction focuses on telling (64% of lessons observed) vs. constructivist approaches. Lessons focused on topics and test questions, as opposed to higher order thinking, throughout the observation period. The change created by NED in this year’s short dose is just a start – more training, content, and activity suggestions are needed.

- Teacher stability is hugely important – replacement teachers at schools with teacher transfers were ineffective users of NED.

In sum, three factors seemed to influence achievement the most:

4. availability of content closely aligned to the teacher’s primary textbook;
5. motivation of the teacher;
6. baseline achievement levels of the students.

Four factors seemed to influence the ability of the programme to scale to different contexts:

5. backing and monitoring of the programme by school managers;
6. degree of variation of new textbooks from those already mapped to content;
7. willingness of schools to fund individual usage for teachers and allow teachers to hold the phones;
8. ability to provide relatively intense face-to-face support to teachers in initial phases of the project, logistically and otherwise.

---

35 The largest videos were 293.7Mb (Science), 137Mb (Science), and 101.2Mb (English)
36 Some of these 80 excess bills were due to NED usage. For example, tn5 recorded the maximum bill of Rs. 2,958 in October 2011 mainly due to heavy downloading of content; she hardly updated her phone during August and September and “caught up” on downloads in October.
Other factors, such as school location, students’ native language, 3G download speed, teacher tech savvy, reliable power supply, etc. seem to be unimportant. Technology that’s easy, empowering, and in the hands of the teacher proved to be a big hit. Content was important, and one shouldn’t neglect the sexiness factor.

**Recommendations for Year 2**

Year 1 of the program was extremely successful. The following key elements should be retained and/or reinforced:

- Emphasis on government and lower-profile schools for scale up;
- Scale up across schools with common textbooks, and/or scale up in subjects like Science that have good commonality across boards;
- Closely mapped content to syllabi;
- 1:1 model with a sophisticated phone;
- Continued academic evaluation, especially for English at CBSE and TN Govt schools;
- 5 on-site support visits, in structured laps;
- Telephone and SMS support outreach, on a regular schedule.

The following elements should be adjusted based on lessons learned:

- Enhanced, directly textbook mapped content for English;
- Higher training dose (to increase the magnitude of change in teaching practice);
- Redub foreign accent voiceovers with Indian voices;
- More control schools and sections;
- EZ Vidya staff should supervise the pre- and post- testing to ensure that students avoid disqualification, experience a consistent protocol, and clearly indicate school, section, and roll numbers on their test papers for matching purposes;
- The phone plan should be 2G, with a hard cap on talk time on SMS and a 1Gb data cap;
- NED should be enhanced if possible to log whether media was played with the TV-out cable attached, to indicate whether a teacher viewed content at home or in class;
- Teachers should be asked to keep a log of which videos were used in class when, to get more accurate usage data and capture media views outside of NED.

Both TN Govt and AP Govt partners have almost tripled their participation, from 47 teachers to 150. TN CBSE schools increased from 7 teachers to 13. More importantly, all partners have increased their financial contribution, either via direct payments or “in-kind” contributions. For example, both Chennai Corporation and APRIES have allocated staff to visit schools, Chennai Corporation has purchased an additional 30 display devices, and TN CBSE schools have purchased additional phones outright. Note: EZ Vidya exited both AP CBSE schools from the program due to their relatively weaker implementations and to minimize syllabi complexity.
Appendices

Appendix A – Confidentiality and Terms of Use

Data in this report has been compiled on behalf of NOKIA and The Pearson Foundation for distribution “as-is” on a non-commercial basis. EZ Vidya asserts its moral right as author. For re-use or citation information, please email bridgeit@ezvidya.com.

As per the agreement with school partners, all personal data gathered in the project is confidential, with schools and teachers “anonymized” via code numbers and school names cropped or “blurred” from photographs.

Appendix B – List of Annexures and Source Data

This report should be read in conjunction with the following annexures:

- Evaluation Database (Excel files a.-l.)
- Site Visit Diary
- Teacher Phone Agreement
- Data Gathering Instruments (SP, TP, CRP)
- Selected Photos
- Sample Pre- & Post- Test Papers
- Bridgeit India Project Framework
- Bridgeit India Government School Nomination Form

Appendix C – General School Conditions

Physical Infrastructure

- All schools in the sample were clean and safe, and had minimum necessary equipment for instruction (e.g. blackboard, desks, solid roof, etc.) The quality of the physical plant varied tremendously. Government schools had low infrastructure budgets and extremely old buildings, furniture, and paint. Private schools were relatively modern, neat and well furnished. Private and government schools varied from large playing fields to no yard at all. APGOVT011 and TNGOVT010 had inadequate space; however, the teachers and children managed by shifting equipment and belongings.

Demographics

- Teachers were 72% female, with an average age of approx. 42. AP government teachers tended to be experienced – the government school system in the program has substantial credential requirements and a long-tenured teaching core. The urban private school teachers were younger, but also well qualified. The CC teachers were of average age and experience, but less qualified.

- The evaluated sample enrolled roughly 1,350 students (35 teachers with an average of 39 students per class), approx. 44% female students. The majority of students were classified as “at risk”, with 66% of students below poverty line (BPL) and 56% first generation learners.

Quality of Administration

- Schools in the sample are well organized and well attended, with professional management and teachers, regardless of size, location, or sector.

Academic Outcomes
All schools in the sample have strong academic programs and outstanding results in 10th standard examinations. Several government schools regularly produce state “toppers”. However, government schools and APCBSE013 face significant challenges in the 5th and 6th standards. These 13 schools have lottery admission for poor students from Telugu-medium schools, and have to provide “bridge” instruction to try and close the gap between these students and classes where entrance is by selective examination. Students’ marks average 60%. 5th and 6th standards use “social promotion”; all students will pass to the next standard at the end of the year, so marks may be a limited measure of absolute ability.

Technology

40% of teachers had low technology skills. All teachers had a phone (36 out of 53 are NOKIA.) 15 teachers did not use computers or telephones beyond voice calls and SMS. At the other extreme, teachers at APOVT005, 009, and 011 were highly tech-savvy and used technology on a daily basis. Note that tech-savvy rating is prone to inflation as it is a self-reported measure. For example, teachers at APOVT007 and APOVT012 reported relatively high computer usage, but the computer labs were observed to be inoperable due to computer virus infestation.

Beliefs About Teaching

All principals and 83% of teachers expressed a clear preference for student-centred instructional strategies, with high student engagement, group work and relatively little lecture. Teachers’ personal development objectives concentrated on collaborative learning, innovative teaching strategies and incorporating technology. Teachers were keen on activities; they overwhelmingly named audio-visual content and demonstrations as “most effective teaching strategies”.

Appendix D – Representativeness of the Sample

The schools and teachers in the sample are broadly representative of candidate Indian schools (schools that meet the minimum requirements to participate in the program, for example, electricity and cell phone signal). Compared to data from National University of Educational Planning and Administration, New Delhi\(^37\), the sample contains larger, higher quality and more techno-savvy schools than the Indian average, skewed heavily towards “at risk” students and skewed slightly towards male students and female teachers:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indian Avg</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Govt. vs. Private</td>
<td>80%</td>
<td>88%</td>
</tr>
<tr>
<td>Enrollment</td>
<td>150</td>
<td>593</td>
</tr>
<tr>
<td>% Female Students</td>
<td>47%</td>
<td>44%</td>
</tr>
<tr>
<td>% Female Teachers</td>
<td>45%</td>
<td>72%</td>
</tr>
<tr>
<td>% Schools Having PC</td>
<td>17%</td>
<td>100%</td>
</tr>
<tr>
<td>% Schools with Adequate Physical Infrastructure</td>
<td>75%(^38)</td>
<td>94%</td>
</tr>
<tr>
<td>% Schools with Electricity</td>
<td>39%</td>
<td>100%</td>
</tr>
<tr>
<td>Pupil Teacher Ratio</td>
<td>33</td>
<td>39</td>
</tr>
<tr>
<td>% Professionally Trained Teachers</td>
<td>81%</td>
<td>100%</td>
</tr>
<tr>
<td>% BPL</td>
<td>37%</td>
<td>66%</td>
</tr>
</tbody>
</table>

The schools in the sample are naturally higher quality than the typical Indian school as very low profile village schools with inadequate infrastructure (no power or signal) and problems of access (low teacher attendance, inaccessible for on-site observation) cannot participate in the program. The schools in the sample also skew towards higher technology due to the quasi-experimental

\(^37\) http://www.dise.in/Downloads/Publications/Publications%202009-10/Flash%20Statistics%202009-10.pdf

\(^38\) Using presence of functional toilet as proxy measure of infrastructure
nature of the project – participants are selected in part based on their expected ability to sustain the program. Academics are representative as the majority of the schools are non-selective and non-fee charging.

Note: Indian average enrollment is skewed low due to 12% of Indian schools being single-teacher schools and Indian average % female teachers is skewed low because 26% of Indian schools have no female teachers.

Appendix E – Theme & Variable Definitions

Geographical Location:

- Schools are designated “Rural” if they are in a small village (not a regional centre) and at least a one-hour drive from the nearest regional centre. Urban schools are within the boundary of a metropolitan area, in this case, Chennai or Hyderabad.

Sector:

- Schools are designated “Government” if they are funded and managed by the state government department of school education (or subsidiary agency, such as the Chennai Corporation), and follow the state mandated syllabus. “Private” schools are funded privately, either through donation or fee collection, managed independently of the state, and have an affiliation with a recognized private school board and curriculum such as CBSE. Sector is therefore an indicator of both funding model and curriculum board.

Economic Status (Profile):

- Economic Status refers to the quality of infrastructure, relative income of student households, if English is spoken at home, and if students have access to technology at school or at home. Schools are designated as “High Profile” if they satisfy at least 4 of the following 5 criteria:
  - Building facilities are modern and well maintained
  - 80% of student households earn more than Rs10,000 per month (At least 80% of households would be classified as middle or high income)
  - Less than 20% of students are first generation learners (80% of students’ parents have formal education)
  - English is spoken in at least 50% of students’ households
  - Personal computers are present in at least 50% of students’ households

Schools are designated as “Low Profile” if they satisfy at least 4 of the following 5 criteria:
  - Building facilities are more than twenty years old or poorly maintained
  - 80% of student households earn less than Rs10,000 per month (80% of households would be classified as low income or below poverty line [BPL])
  - 80% of students are first generation learners (<20% of students’ parents have formal education)
  - English is spoken in 5% of students’ households or less
  - Personal computers are present in 5% of students’ households or less

Student Strength:

- Large schools have more than 500 students, and small less than 500, where average school size in the sample is 820 students and median is 405 (i.e. schools are either much less than 500 students or much more than 500, with one school of 3,300+ students skewing the sample)

Gender: All Girls / Co-Ed / All Boys

Academic Achievement:

- Schools are designated as “High” achieving if 5th & 6th standard students average 60% or marks or higher, and the pass percentage of 10th students at the school is 90% or greater.
(10th standard exams are uniform across schools of a particular board and are a relatively objective of overall academic rigour.) “Low” achieving schools have 5th and 6th standard marks of less than 60% or less than a 90% pass rate for 10th standard.

School Technology:

- School Technology refers to the quantity, quality and utilization ability of technology in the school. Schools are designated as “High Tech” if they satisfy at least 5 of the following 7 criteria:
  - At least 1 working (good condition) PC for every 20 students
  - Multiple LCD projectors, large screen displays, or interactive whiteboards
  - Reliable power supply (or sufficient backups)
  - Students are allowed to use computers
  - At least 75% of the teaching staff are comfortable using computers
  - Teachers or students use technology often
  - School has purchased a packaged computer solution, such as Edurite

- Schools are designated as “Medium Tech” if they satisfy at least 5 of the following 7 criteria
  - At least 1 working (good condition) PC for every 30 students
  - 1 LCD projector, large screen displays, or interactive whiteboards
  - Reliable power supply (or sufficient backups)
  - Students are allowed to use computers
  - At least 50% of the teaching staff are comfortable using computers
  - Teachers or students use technology sometimes
  - School has purchased a packaged computer solution, such as Edurite

- Schools which do not meet the conditions for “Medium Tech” are “Low Tech”.

School Preferred Teaching Style:

- A school’s preferred Teaching Style is a measure of the frequency of different types of instruction reported by the school management. “Student centred” (SC) describes classrooms where students have control of their learning activities, for example, students choose research topics or students present new material to their peers. Schools where students work often in groups, and often ask questions of teachers, are SC. “Direct instruction” (DI) refers to lecture style instruction, where the teacher is the main focus of attention.

School Average Teacher Quality:

- School Average Teacher Quality is a measure of the experience (number of years spent teaching), training and qualifications of the typical teacher at the school. Schools are designated “High Quality” if the average teacher has a post-graduate degree in addition to a B. Ed. and more than 10 years of teaching experience. Schools are designated “Medium Quality” if the average teacher has some education beyond B. Ed. and 5 or more years of teaching experience. Schools whose teachers average a B. Ed. or less qualifications, and less than 5 years experience, are designated “Low Quality”.

School Internet:

- Schools are designated as “Connected” if teachers have access to a reliable broadband connection and regularly check email or surf the Internet (access may be from home or through a 3G device). Schools are “Not Connected” if teachers do not use the Internet regularly.

Teacher Teaching Style (Reported & Observed):

---

Teaching Style is a measure of the frequency of different types of instruction reported by the teacher or observed by the field consultant during a lesson. It is independent of teacher quality. “Student centred” (SC) describes classrooms where students have control of their learning activities, for example, students choose research topics or students present new material to their peers. Schools where students work often in groups, and often ask questions of teachers, are SC. “Direct instruction” (DI) refers to lecture style instruction, where the teacher is the main focus of attention. Teachers are designated SC if they self-report or observed during CRP as often or always demonstrating indicators of a student-centred classroom:

- Students working in pairs or small groups
- Teacher circulating around the classroom & “checking in” at least once with all students
- Teacher asking probing questions & encouraging creative responses
- Hands-on experiments by students
- Physical activities
- Students asking questions
- Encouraging collaboration
- Students presenting or leading class
- Less than 40% of class time in whole-class instruction
- Teacher talking for less than 30% of class time

DI teachers may report and/or exhibit some of the above behaviours during CRP, however, they tend to demonstrate the following indicators:

- Desks in rows, with students working on their own
- Teacher lecturing and writing on the board
- Teacher reading from the textbook
- Teacher asking factual questions & expecting / drilling for specific responses
- Teacher at their desk or otherwise not engaging with students while students work
- More than 40% of class time in whole-class instruction
- Teacher talking for more than 30% of class time

Teacher Quality:

- Teacher Quality is a measure of the experience (number of years spent teaching), training and qualifications of the teacher. Teachers are designated “High Quality” if they have a post-graduate degree, more than 10 years of teaching experience, and are bilingual in English and the local language. Teachers are designated “Medium Quality” if they have some education beyond B. Ed. (including professional development), 5 or more years of teaching experience and are bilingual. Teachers with a B. Ed. or less qualifications, and less than 5 years experience, are designated “Low Quality”.

Lesson Quality:

- Lesson Quality is a measure of the effectiveness of a lesson, both in planning and in execution. It is a composite of several teaching practices, both positive and negative, observed during CRP. Practices are given equal weight, such that a teacher who exhibits one effective (+1) and one ineffective (-1) practice will have a net score of zero. The average rating of all pre-intervention lessons was +16.7, with a standard deviation of 5.5. “High Quality” lessons are those lessons at least ½ a standard deviation above average (>19.4), “Medium Quality” within 5.5 of the average (13.9 – 19.4), and “Low Quality” less than 13.9.

“Effective” practices are defined as any of the following 36 things:

- asking probing questions
- encouraging [student] collaboration
- reinforcing classroom routines
- communicating high expectations
• using visual diagrams...and graphic organizers
• encouraging creative responses
• activating multiple intelligences
• demonstrating an experiment
• checking for understanding
• making connections to prior knowledge
• giving feedback on student work
• prompting student to reflect on their thinking
• playing [an educational] game
• [students] working 'hands on'
• [students] presenting or leading discussions
• clear beginning, middle, and end [to the lesson]
• appropriate and interesting content
• lesson met expected learning outcome
• lesson closing summarized main ideas
• instructions clear and well communicated
• [teacher] used class time efficiently
• smiling / pleasant teacher
• teacher easily audible
• humourous or fun activity
• rules or classroom norms posted
• teacher reacts appropriately to off-task students
• students polite and well-behaved
• student work on-display
• attractive wall posters or displays
• [teacher uses] inclusive language (we, us, our)
• most students on-task throughout
• teacher comfortable with students
• majority of students enthusiastic or attentive
• teacher talk-time 40% of the lesson or less
• student time on task 50% or more
• overall lesson rated as effective by observer.

Ineffective practices are defined as:
• [teacher] reading from the book
• [teacher] asking factual questions
• teacher grading papers [in class]
• disciplining students [during classtime]
• students copying lines
• students reciting in unison
• teacher not comfortable with students
• majority of students passive or inattentive
• 5% or more of students disruptive
• teacher talk-time 50% of the lesson or more
• students on task less than 50% of the lesson
• lesson rated as ineffective by observer.

Teacher Technology Skills (Techno-Savvy):

• Tech-Savvy is a measure of how often teachers report using technology, on a scale of 1-4 (1-Rarely or Never, 4-Almost Always.) Teachers who report average use as Often (greater than 2) are “High Techno-Savvy”. “Medium” teachers average between 2 and 1.5 (Sometimes), and “Low” teachers <1.5 (Rarely or Never).
Appendix F – Teachers’ Goals as Reported during Baseline & Endline

<table>
<thead>
<tr>
<th>Goal</th>
<th>Baseline # of teachers listing as priority 1, 2, or 3</th>
<th>Baseline Rank of importance</th>
<th>Endline # of teachers listing as priority 1, 2, or 3</th>
<th>Endline Rank of importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms becoming more active and 'student centred'</td>
<td>33</td>
<td>1</td>
<td>46</td>
<td>1</td>
</tr>
<tr>
<td>Increasing your use of technology</td>
<td>23</td>
<td>3</td>
<td>44</td>
<td>2</td>
</tr>
<tr>
<td>Using innovative teaching methodologies</td>
<td>28</td>
<td>2</td>
<td>42</td>
<td>3</td>
</tr>
<tr>
<td>Helping students develop 21st century skills</td>
<td>18</td>
<td>5</td>
<td>37</td>
<td>4</td>
</tr>
<tr>
<td>Students earning high marks</td>
<td>20</td>
<td>4</td>
<td>33</td>
<td>5</td>
</tr>
<tr>
<td>Working more collaboratively together with other teachers</td>
<td>10</td>
<td>7</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td>Covering the entire syllabus</td>
<td>10</td>
<td>6</td>
<td>28</td>
<td>7</td>
</tr>
<tr>
<td>Reduction in absenteeism</td>
<td>9</td>
<td>9</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Increasing Parental involvement</td>
<td>10</td>
<td>8</td>
<td>16</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: Endline top 3 priorities are greater than 159 responses due to teachers listing more than one goal as top priority

Appendix G – Support Tickets by Type

![Pie Chart of Support Tickets by Type]
Appendix H – Project Consortium

NOKIA is a corporation with diverse business interests around the offering of mobile handsets and services and also involved in several high-impact corporate social responsibility projects using mobile technology and services to address social and community needs around education, health, livelihood, among others.

NOKIA Steering Project Committee Members:

- Gregory Elphinston, Corporate Relations & Responsibility Gregory.elphinston@nokia.com
- Pranshu Singhal, Head of Sustainability India pranshu.singhal@nokia.com
- Bhanu Potta, Global Product Manager - Learning & Knowledge Services, NOKIA Life bhanu.potta@nokia.com

The Pearson Foundation is the nonprofit arm of Pearson, the international media company, which promotes literacy, learning and great teaching, by collaborating with leading businesses, not-for-profits and education experts.

Pearson Foundation Project Steering Committee Members:

- Jenny Raymond, jenny.raymond@pearsonfoundation.org
- Susan Tu, susan.tu@pearsonfoundation.org

EZ Vidya Pvt. Ltd. is a pan-India educational services company, with offices in Chennai, Coimbatore, Hyderabad, Bangalore, and Delhi. EZ Vidya’s core services include: curriculum & content development, teacher training, and strategic education consulting. EZ Vidya has developed and implemented education research programs for a wide range of partners, including IBM, Dell, Wipro, and AIF. EZ Vidya staff interact with hundreds of schools and over 2,00,000 students in NCR, Punjab, Rajasthan, Uttar Pradesh, Karnataka, Kerala, Andhra Pradesh, and Tamil Nadu on a daily basis.