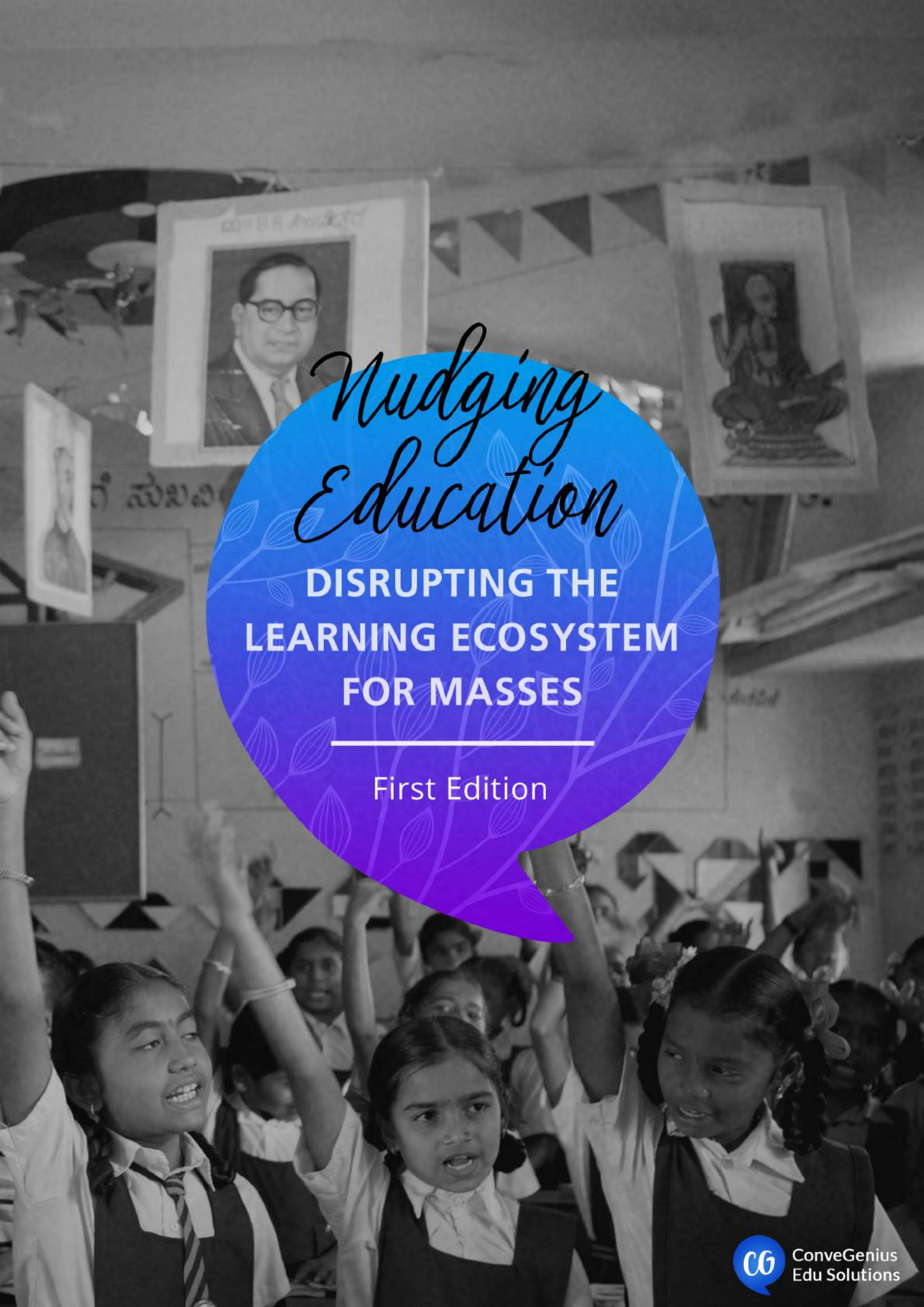

Nudging Education

DISRUPTING THE LEARNING ECOSYSTEM FOR MASSES

First Edition

ConveGenius Edu Solutions

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NUDGED LEARNING

A ConveGenius Impact Study

FOREWORD

CEO Speak

In 2017, Richard Thaler was awarded the Nobel Prize for his 'Nudge Theory' in Behavioral Economics. The concept of a 'nudge', where a slight change in the environment could create a considerable influence in the desired behaviour was a genius idea with numerous implications towards innovation in policy and technology design. It could be applied in any domain to influence human psychological behaviour.

At ConveGenius, as an Ed-tech Social Enterprise, we are persistent towards enhancing learning outcomes and bridging learning gaps by investing in innovation.

The largest hurdle we face today with self-learning technology systems is its restrictive nature of accommodating only children who are intrinsically motivated to learn. The remaining children drift to activities that are more fun, which is natural human behaviour, although not 'rationale'. For example, if a child is given the option to choose between watching YouTube videos and learning from a digital app, the choice skews towards watching cartoons on YouTube almost 95% of the time.

Since, only 5-10% children are motivated with the necessary curiosity to learn without external influence, self-learning systems become restrictive to the achievers – *a minority in the masses.*

This is one of the reasons why MOOCs like Coursera, EdX and Udemy have had low completion and mediocre retention rates.

Teachers, therefore, play a key role in influencing student behavior in classroom environments where learning happens in groups. A periodic and predictable program where teachers create the necessary ethos of a classroom can influence the focused behaviour required for a child to learn without distractions.

However, standardized teaching, where one teacher is catering to a diverse group of children with a one-lecture-fits-all approach, does not quite drive the full potential of learning. On the contrary, self-learning technology systems promise adaptive and personalized learning paths.

Hence, the struggle to utilize the advantages of personalised technology systems and the benefits of a standardised classroom environments together cascades to designing processes and technologies that can drive and 'nudge' stakeholder behaviour (In this case – the child, teacher and parent) that achieve desired learning outcomes at the highest potential.

This peculiar struggle presents us with an opportunity for us to apply the 'nudge theory' and design a platform that utilizes adaptive and personalized technology systems, along with the benefits of a teacher-led environment; defining *a Nudged Learning paradigm*. We have designed our first-year analysis on a Tab-lab program in after-school centers applying nudges in content style, content rigor, data-led actionable, data-led triggers, and program design. A child's behaviour is not always in alignment with their intentions, but the value-action gap of children seems relatively more predictable compared to adults, and therefore making it easier to design 'nudging' environments to drive engagement and learning outcomes for education.

> This publication by the ConveGenius team introduces the results of our first year as a Nudged program and illustrates the quantifiable outcomes in the form of a case study. The program has been tested on a large-scale intervention across 13 states encompassing more than 50,000 children between Grades 6th to 10th.

These results will help us with our next iteration in building changes to the nudges with additions in adaptive learning, curated and AI-mapped content styles, personalization of games, animated videos, teacher-driven videos, interactive books and AR-based content to determine personality-driven content nudges; data analytics that diagnose concept gaps and predict actionable triggers for data nudges; and 3rd party standardized assessments measuring relative longitudinal impact to re-design program nudges.

We thank all our partners – The Michael and Susan Dell Foundation, Mr. Rajat Dhawan and Benori Ventures who have been encouraging investors; Gray Matters India and Naandi Foundation as partners with us in our endeavor to create a disruptive system that will result in large scale educational impact.

Gratitude,

Jairaj Bhattacharya,
CEO and Co-founder, ConveGenius

CONTENTS

1 Introduction

Our Story

Towards an ideal state of education...

Convegenius is a social enterprise committed in its mission to bridge the extant learning gaps in India by providing cost-effective technology solutions, innovative remedial programs, and advanced data reporting.

Aspiring for a better state of education in the country, we have partnered with schools, NGOs, and CSRs looking to create impact, and our work with many bottom of the pyramid interventions have helped us make a considerable impact in addressing the problems faced by children and the respective organisations.

Our Reach

2,30,000+
Children

9
Mediums of Instruction

570+
Schools Digitised

50+
Implementation Partners

2,270+
After-school Centers

32+
Locations

2,500+
Teachers Trained

16
States

Vision

We envision an ideal state of education in India with smaller achievement gaps in learning and increased number of admissions in higher classes. In short, an education system that doesn't race ahead of the child's capacity to learn.

Mission

To bridge the learning gaps existing all over India in an affordable way and to make quality solutions accessible to one and all. To ensure a learning mapped to the levels of children and not the class they're in.

Strategy

Implementing innovative programs through affordable and scalable technology solutions that not only address children's learning needs but which also give nuanced feedback and instant reporting for all the stakeholders.

Value

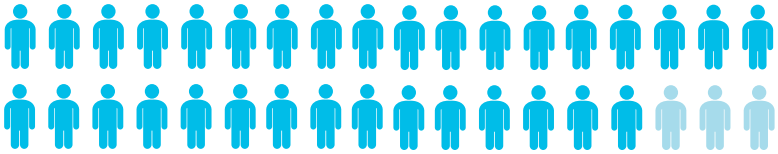
We undertake to continually develop our programmes and build long-lasting relationships with our partners. Transparency is vital to our model and we understand our dual responsibility as we are not only accountable to the donors but are also equally responsible for the communities with whom we work.

1.1 One Cause

To remove the Stumbling Blocks in Education that leads to learning gaps

Learning gap is the disparity between what a student has actually learned and what he or she was expected to learn at a particular age or grade.

Over 200 million children in India, **90%** of them at below grade level competency.



What is Grade Level Competency?

This means assessing the child on the basis of the proficiency that he/she might or might not possess before getting promoted to the next grade.

While the enrollment has doubled from **11 million to 22 million** in standard VIII, about **50%** of the kids in standard VIII can't read a standard IV text.

27% children in Std VIII are unable to read a Std II level text and **57%** are unable to do simple division problems that are taught in Std IV.

Source: ASER | Vexels

1.1.1 Why does this need urgent attention?

Reports also show that despite completing elementary education, the dropout rate after standard VIII is escalating.

1.1.2 Why do such gaps exist?

- Each child has a different level of understanding, but the learning process is still calibrated according to the grade to which a child belongs.
- Under the Automatic Promotion Policy that came into force on April 1, 2010, introduced by the RTE act, each child is given free education and compulsory promotion up to standard VIII, until August 03, 2017, when it was scrapped for classes 5-8.
- The number of students is increasing and the number of skilled teachers decreasing.
- According to various reports, over 90% of the teachers aren't well equipped to teach students of different learning levels together.
- Available technology solutions in the market **alone** do not cater to every child's learning needs.
- Not all parents can afford private tuitions or other solutions in the market for their children.

1.2 Our Solution

Bridging gaps through NUDGED LEARNING

With the ambitious goal of an ideal state of education, we have implemented programs in over 25 locations across 13 states all over India, scripted according to the principles of nudged learning.

Nudged Learning is a learning style that believes that a series of nudges, both automatic (technology triggers) and manual (actionable data-led, facilitator initiated) teach a child most effectively.

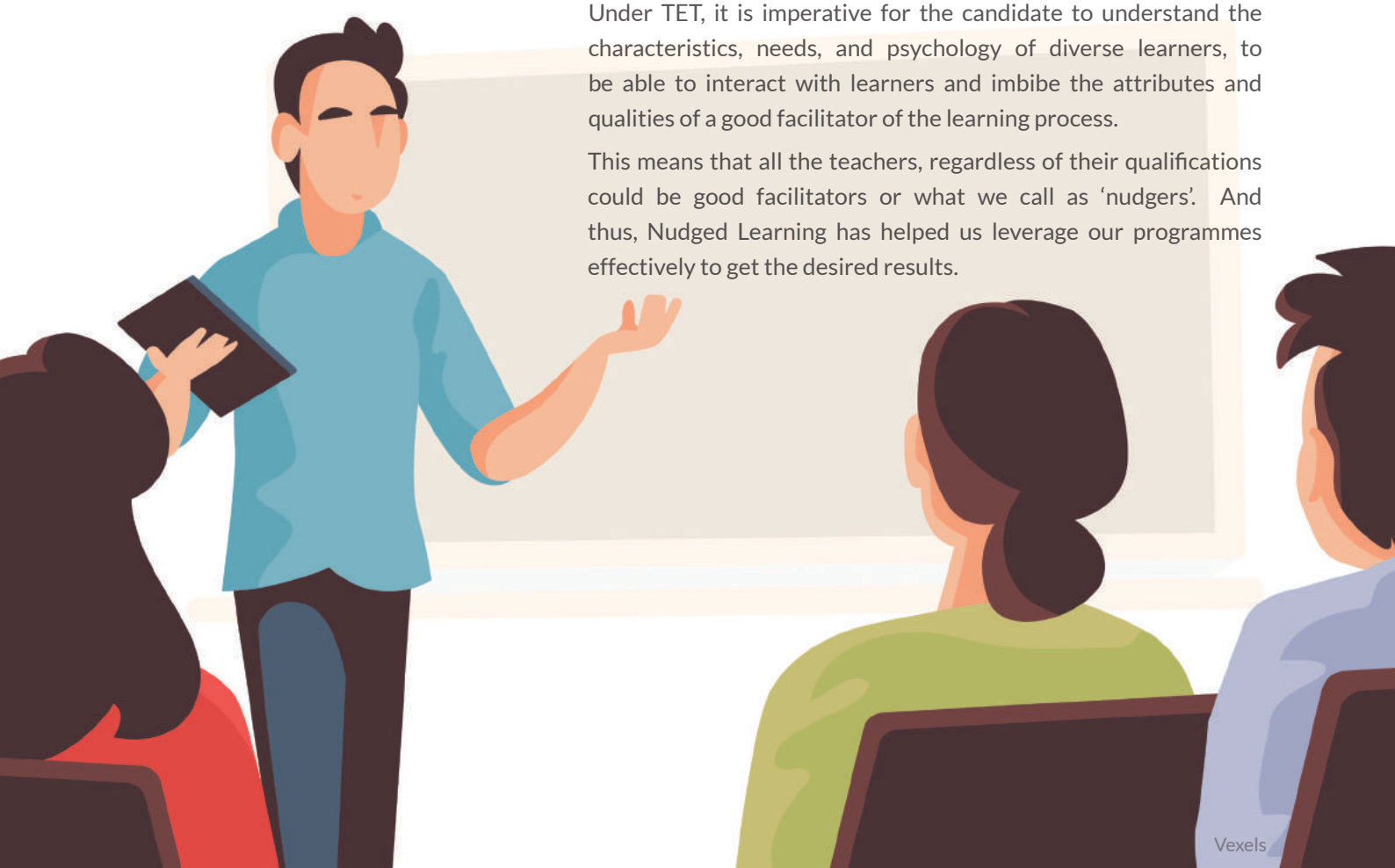
Here, we equip the nudger with our technology-based solution to ensure they facilitate efficiently. The child learns through nudges that are triggered either while learning through our technology-based solutions, or by the ones initiated by the nudger in the classroom.

How Nudged Learning is different from the other learning styles?

According to the Right to Education Act, 2009, under section 23, National Council for Teacher Education has made it compulsory for a candidate to pass the Teacher Eligibility Test (TET) to be able to teach classes I-VIII.

Under TET, it is imperative for the candidate to understand the characteristics, needs, and psychology of diverse learners, to be able to interact with learners and imbibe the attributes and qualities of a good facilitator of the learning process.

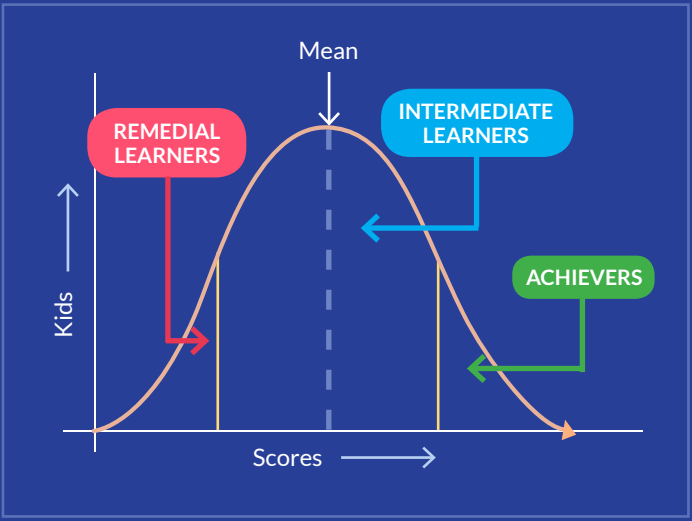
This means that all the teachers, regardless of their qualifications could be good facilitators or what we call as 'nudgers'. And thus, Nudged Learning has helped us leverage our programmes effectively to get the desired results.



Vexels

1.3 Nudged learning and Different Learning Categories

After assessing the proficiency level of kids/learners through our baseline (*tests before learning*) and endline (*tests after learning*) assessments, we tagged the learners into three different categories, viz. **remedial learners**, **intermediate learners**, and **achievers**.



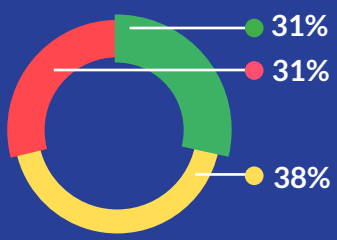
Does nudged learning work for different learners?

Statistics given below have been shared by our program analyst and show how nudged learning has affected the learning outcomes of different types of learners.

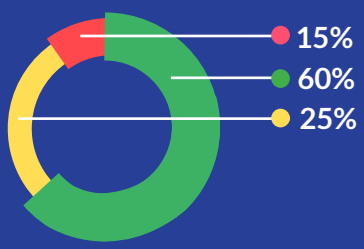
Movement across different learning categories owing to the implementation of the nudged learning program was studied using a mean-half standard deviation model.

Subject- English | Total No. of students- 38,386

Before the program

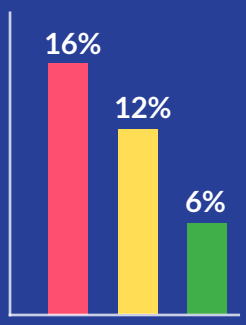


After 1 year



Remedial Learners | Intermediate Learners | Achievers

Improvement Percentage



This shows that both remedial and intermediate learners have shown significant improvement in learning. Let us understand the reason why nudged learning is a proven game changer for underachievers.

Learning Style	Teacher-led Learning	Nudged Learning	Self Learning
Belief System	Solely dependent on the teacher, a good teacher is central to the learning process	External triggers like technology are responsible in motivating the child, along with a facilitator	A series of powerful internal triggers and feedback loops are sufficient to teach
Target Segment	Ideally, if the teacher is good, all kinds of learners benefit	Remedial and intermediate learners benefit most	All currently available solutions cater to the intrinsically motivated achievers
Challenges	**95%** of the teachers aren't skilled enough to teach children of different learning levels	Diagnostic assessments and real-time data are central to success	A truly adaptive and personalized solution is necessary which gives instant feedback, that makes it expensive
Resources Required	Presence of skilled teachers, while maintaining an appropriate teacher-pupil ratio	Facilitators, affordable technology, limited internet for implementation	High computing, high internet connectivity, high-budget
Scalability	Chances that this scales is low in a densely populated country like India, as skilled teachers are scarce	With trained facilitators and cost effective tech solutions, learning outcomes can be improved to a great extent	Not scalable for interventions with low budgets and for underachievers as these follow a one-size-fits-all program approach

1.4 Championing our Cause

Through our Innovative Programs, Affordable Technology Solution and Real-time Impact Dashboards

Our Programs

We have touched over 32 locations and 16 states through our after-school and in-school interventions. These include urban, rural and tribal locations. Our programs focus on leveraging technology and achieving the goal of filling learning gaps prevailing in all parts of the country.

We collaborate with Government Schools, Municipal Schools, Affordable Private Schools, Budget Private Schools to create State-of-the-art Tab-labs for kids to get an enriching experience through our tablets. Tablets work in both online and offline models.

We have also partnered with many grassroots organizations and communities to equip their after-school interventions with our remedial programs and with highly scalable, and extremely affordable technology solutions.

Our Programs Involve

Intensive Teacher/Facilitator Training for all to understand the scattered responses and queries of the students and help.

Operational Design that includes implementation, installation, and feedback loops structured well in advance.

Classroom Scripting that includes how CG Slate would help the child learn, how the whole learning cycle would be, and what kind of nudges the child would constantly receive.

Technical Training for management and staff to understand technical integrations and the configurations of the tablets being used for learning.

Data-driven Operational Feedback to ensure seamless work processes and the rectification of errors as and when identified.

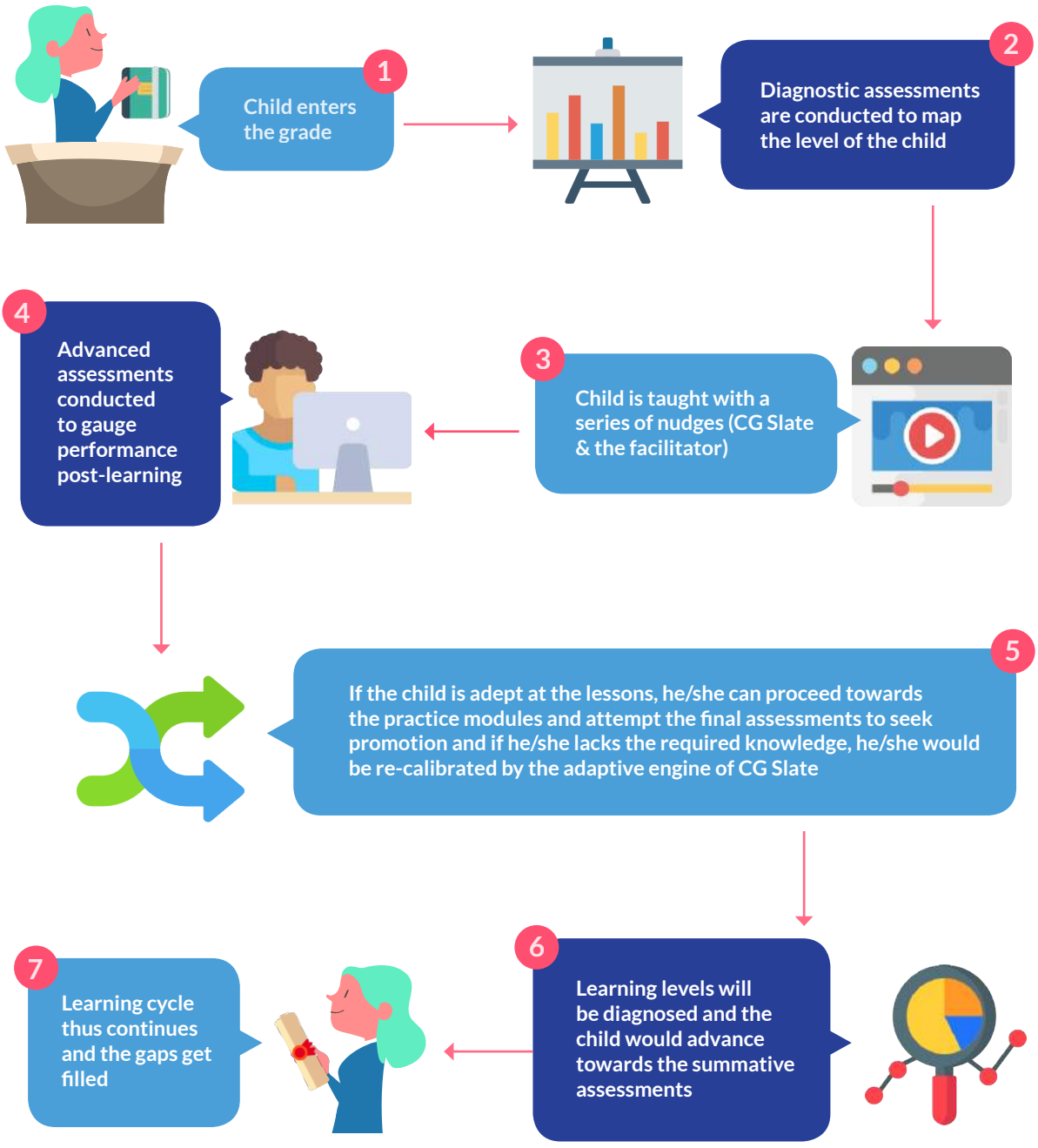
At the centre of our Programs and the Nudged model is our Learning Platform - CG SLATE

A semi-adaptive and personalised learning platform that discerns learning levels of the child through its diagnostic assessments and then pushes appropriate content to fill all kinds of gaps.

Strengthening of the basics is done through our engaging content in the form of videos, educational games, interactive books, quizzes, that are available in both online and offline models.

Learning content is aggregated in all forms from the best creators in the market. Our in-house pedagogy experts curate it, and map it to standard curriculum frameworks.

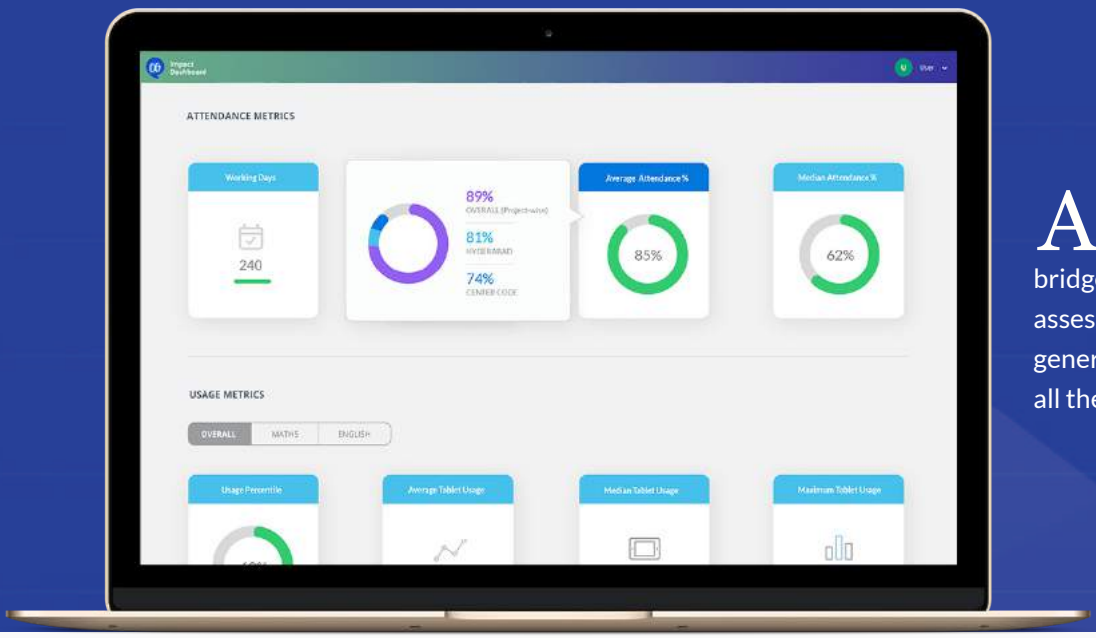
1.5 Nudged Learning Approach



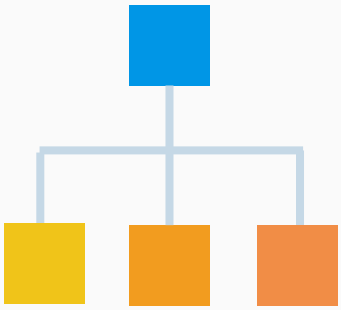
Technology has proliferated in all walks of life. Using technology-enabled programs can empower many teachers and centers with better learning opportunities. CG Slate adapts its learning trajectories to cater to individual needs through advanced and engaging assessments, nuanced feedback loops, and state-of-the-art reporting.

1.6 Our Real-Time Data Dashboards

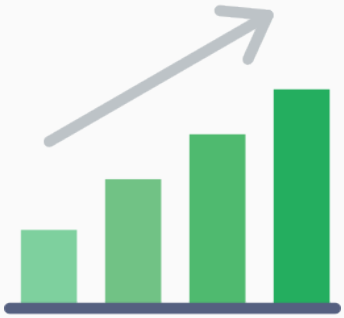
Track and measure the impact and effectiveness of the whole program



An important requirement for this model to work and bridge the learning gaps is to assess the child completely and generate personalized reports for all the stakeholders.



Our Data Dashboards act as a robust MIS, by providing partners with actionable data, and advanced visualisations to make sense of learning and overall operations.



All Data is automatically fed to our servers ensuring Transparency, Accountability, and it helps shape strategic decisions for Donors and Decision Makers.

Auto triggers for feedback, leaderboards, and benchmarking ensure continuous enhancement of learning outcomes.

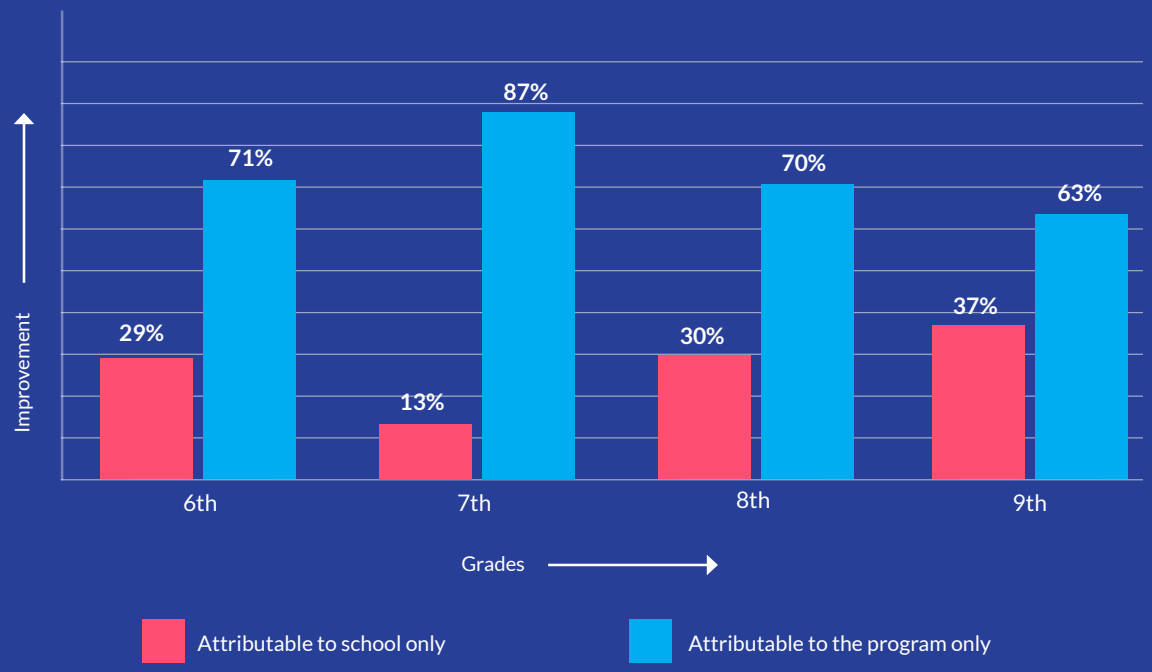
1.6.1 Nudged Learning has Proven to be Transformational

We let our data speak!

Here are the results from one of our after-school intervention actively running and edifying children with the required skills and knowledge.

Improvement Attributable to the Program

A sneak peek into how the secondary classes have shown improvement after learning through our tablets and program.



To analyse the learning outcomes, Baseline and Endline scores of each student have been considered.

- **Baseline:** The performance of a child prior to learning through CG Slate.
- **Endline:** The performance of a child after learning through CG Slate. (The difficulty level of Baseline assessment and Endline assessment are always the same in order to fairly understand the improvement in a child)

1.7 About this Case Study

The data presented here is for an after-school intervention implemented by a large NGO partner which caters to girl children between Classes 6 to 10, primarily catering to children going to government schools in very needy pockets across the country. These include Urban (Delhi, Mumbai), Rural (Moga, Barabanki) and Tribal (Ratlam, Krishnagiri) pockets.

Subjects covered are Math (in the medium of instruction) and English (which features level-based, phonics-led content, which is the same for all grades).


5 Classes


14 Locations


2 Subjects


50k+ Kids


7 Mediums of Instruction


Hours: 1.5 hours/day


Working Days: 6 days/week

MATH IS COVERED IN THESE MEDIUMS – ENGLISH, HINDI, MARATHI, TAMIL, TELUGU, PUNJABI, BENGALI, AND URDU.

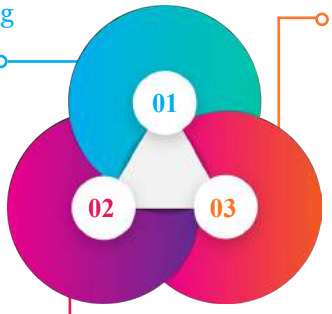
All learning centres are run by facilitators, who are not trained teachers. Most of them do not have a graduate degree.

The entire Program for the session 2017-18 has been summarised based on the data for each child.

Where does CG fit in?

Operational Structure and Training

1. Designed a classroom script based on 1:3 ratio, dividing the classroom into three operational zones, viz. Learn Zone, Revision Zone, and Practice Zone.
2. Trained their supervisors (3 day training) on all the learning/operational/data processes, and their facilitators (1 day training) on the classroom script.



Learning Platform (CG Slate)

1. Involved right from the initial ideation phase in the roles of a programs, a training, a technology and a data partner.
2. Learning content, including practice papers (print)
3. Attendance module on our application.

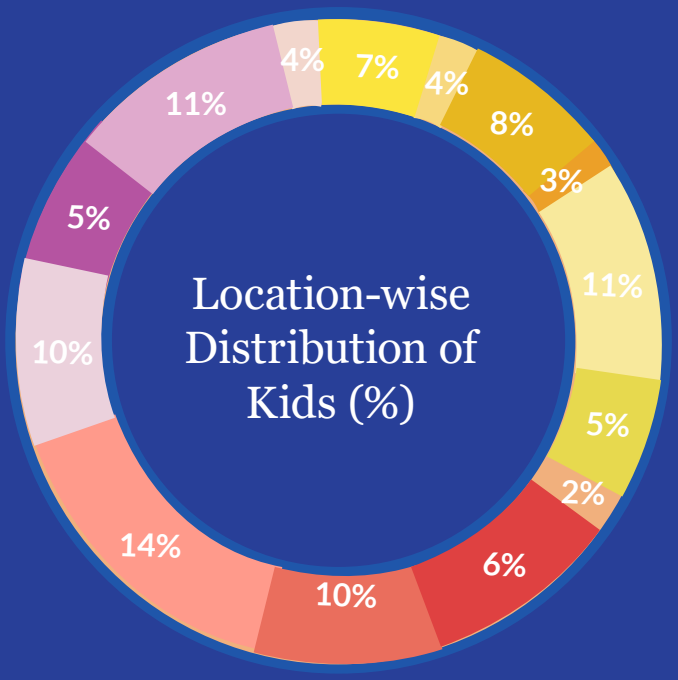
Data Centric Innovation

1. Customised reporting templates at various levels, viz. Facilitator (Centre), Supervisor, Program Officer, and the Management Team.
2. Detailed reports on a quarterly basis.

Tablet to children ratio of 1:3 (a child used the tablet once in three working days)

What Data is Studied?

- Locations: 14
- Number of Children: 46,750
- Duration: 9 months (July 17- March 18)
- Mediums of Instruction: 7
- Usage: 6-8 hours/child/month



- For all further analysis, the data for Darjeeling and Kolkata locations has been excluded, as they follow a different Academic Session, their session begins in January.
- For Usage/Learning, only kids who have finished at least one chapter (in each subject) have been considered.

  Math: 35,782 kids

  English: 38,386 kids

The key points that have been analysed are:

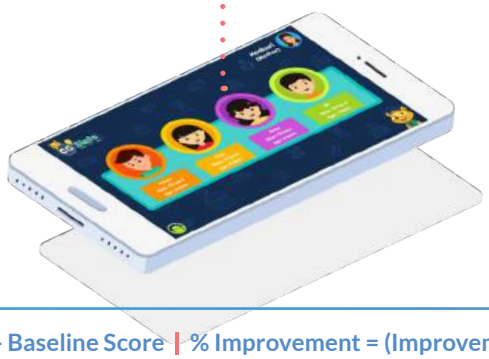
- Attendance
- CG Slate Usage and Syllabus Completion
- Learning Outcomes

How is Learning Data Analysed?

Pre-Test → **A Chapter on CG Slate** → **Post-Test**

The performance of a child prior to learning through CG Slate

Average of Pre-Test scores for all chapters is called the Baseline Score.



The performance of a child after learning through CG Slate

Average of Post-Test scores for all chapters is called the Endline Score.

Improvement = Endline Score - Baseline Score | % Improvement = (Improvement/Baseline Score) * 100

- We study the impact in quantitative and qualitative terms.
  1. Only when a child has completed at least 1 chapter, Usage and Learning Data has been considered.
  2. Also, data points are compared across locations to understand variations.
- To analyse learning outcomes, Baseline and Endline scores of each student have been considered.

> **The difficulty level of a Baseline assessment and the corresponding Endline assessment are always the same to fairly understand the improvement in a child.**

Coordinator and Teacher Training in Delhi/NCR and Moga for the Nanhi Kali Program and in Mumbai for Magic Bus India Foundation.
'We believe in building a cadre of teachers who emerge as good facilitators in the classrooms with the aid of learning tablets.'

Facilitator Training in Noida for Nucleus Software Foundation.
'With the improvement in all the grades, NSF Tab Program continues to impact the lives of thousands of kids in the year 2017-18.'

2 Attendance Highlights

Under this section, we have benchmarked the attendance based on the average time required by a student to cover the entire syllabus on CG Slate.

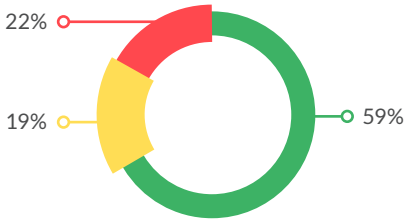
For example,

- Total days: 6 days/week
- Days in Learn Zone (CG Slate Usage): 2 days/week
- Average time required = (Total days/3) + Time required to cover the entire syllabus

Based on this, total kids have been classified into attendance categories, viz., Good Attendance, Average Attendance and Poor Attendance.

The thresholds for Attendance and Completion categories are defined uniquely for each Intervention.

Percentage of Kids in Each Category



Attendance Category	Range
Good	>70%
Average	>50 and <=70
Poor	<=50

2.1 Location-wise Distribution of Kids

Based on the same criteria, kids have been categorized location-wise to get an insight of the performance of each location.

Location	Good	Average	Poor
Barabanki	30.42%	30.07%	39.51%
Chakan	85.64%	8.94%	5.42%
Delhi	**29.72%**	**24.43%**	**45.86%**
Gurgaon	44.20%	26.44%	29.36%
Krishnagiri	81.70%	7.15%	11.15%
Moga	50.24%	34.73%	15.03%
Mumbai	53.85%	16.39%	29.75%
Nashik	81.36%	10.44%	8.20%
Noida	58.71%	24.42%	16.87%
Ratlam	58.08%	22.48%	19.43%
Varanasi	38.62%	22.97%	38.41%
Vizag	**88.03%**	**7.20%**	**4.77%**

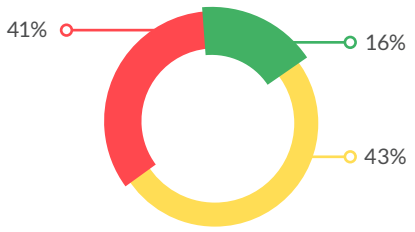
Best Performer Worst Performer

3 Usage & Syllabus Completion

1. This section shows the total syllabus completed by the students in the academic session 2017-18.
2. The total number of kids have been categorised based on the syllabus that they have completed.
3. The classification has been done separately for Math and English.
4. For Math, the kids have been further divided based on the medium of instruction, i.e., Hindi and non-Hindi.
    - This has been done because for all the other mediums, Math was introduced later. Therefore, the time was not enough to expect them to complete the entire syllabus.
5. So, for the kids in the non-Hindi locations, only partial completion of the syllabus has been considered for the categorisation.

3.1 English

Percentage of Kids in Each Category



Category	Range of Syllabus Completion
Good	>60%
Average	>30% and <=60%
Poor	<=30%

3.1.1 Location-wise Distribution of Kids

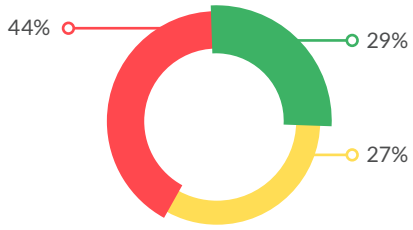
Location	Total Kids	Good	Average	Poor
Barabanki	1529	14.91%	31.59%	53.50%
Chakan	**3643**	**26.08%**	**70.33%**	**3.60%**
Delhi	3370	15.46%	25.13%	59.41%
Gurgaon	2169	16.04%	33.43%	50.53%
Krishnagiri	2677	21.96%	63.80%	14.23%
Moga	4588	9.98%	68.33%	21.69%
Mumbai	5036	2.96%	37.29%	59.75%
Nashik	4710	37.92%	48.45%	13.63%
Noida	2232	17.97%	27.60%	54.44%
Ratlam	3571	11.43%	23.58%	65.00%
Varanasi	**1772**	**0.34%**	**30.42%**	**69.24%**
Vizag	3089	4.14%	38.78%	57.07%
Grand Total	38386	15.56%	43.81%	40.64%

Best Performer Worst Performer

3.2 Math (Hindi Medium)

Locations: Barabanki, Delhi, Gurgaon, Mumbai, Noida, Ratlam, Varanasi

Percentage of Kids in Each Category



Category	Range of Syllabus Completion
Good	>60%
Average	>30% and <=60%
Poor	<=30%

3.2.1 Location-wise Distribution of Kids

Location	Total Kids	Good	Average	Poor
Barabanki	1598	31.54%	33.17%	35.29%
Delhi	3379	31.67%	25.13%	43.21%
Gurgaon	**2202**	**34.88%**	**30.93%**	**34.20%**
Mumbai	**1733**	**10.91%**	**30.70%**	**58.40%**
Noida	2288	33.83%	29.59%	36.58%
Ratlam	3909	23.36%	27.88%	48.76%
Varanasi	1793	19.24%	33.74%	47.02%
Grand Total	16902	27.00%	29.37%	43.63%

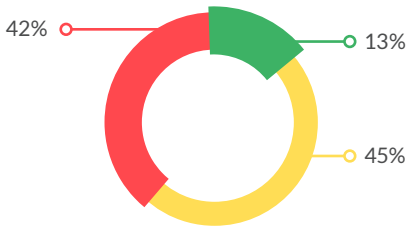
● Best Performer ● Worst Performer

3.3 Math (Other Mediums)

Locations: Chakan, Krishnagiri, Moga, Mumbai, Nashik, Vizag

These are considered separately as Math was taught here only for 3 months, as against 9 months in other locations.

Percentage of Kids in Each Category



Category	Range of Syllabus Completion
Good	>40%
Average	>15% and <=40%
Poor	<=15%

3.3.1 Location-wise Distribution of Kids

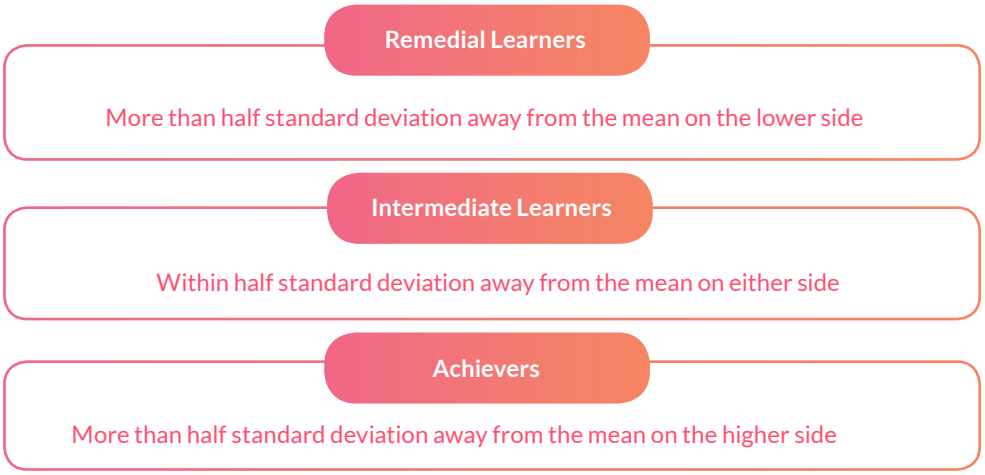
Location	Medium	Total Kids	Good	Average	Poor
Chakan	Marathi	3561	1.66%	48.95%	49.40%
Krishnagiri	Tamil	2235	14.54%	46.98%	38.48%
Moga	Punjabi	3409	1.47%	43.44%	55.09%
Mumbai	**Marathi/Urdu**	**2184**	**1.14%**	**29.40%**	**69.46%**
Nashik	**Marathi**	**4432**	**37.07%**	**40.93%**	**22.00%**
Vizag	Telugu	3059	13.27%	57.31%	29.42%
Grand Total	-	18880	13.28%	44.93%	41.78%

● Best Performer ● Worst Performer

4 Learning Outcomes

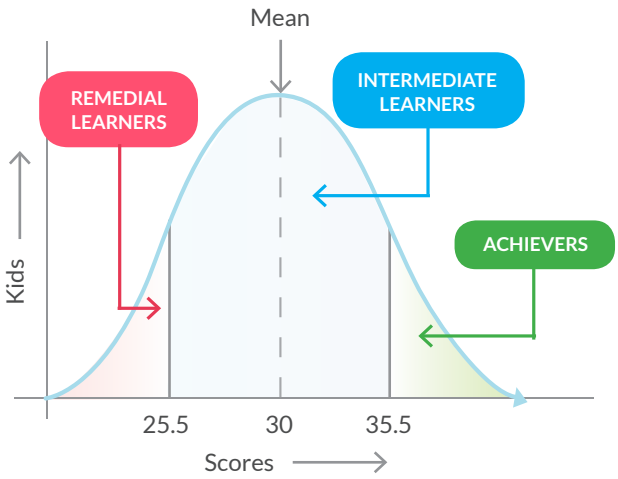
- In order to showcase the learning outcomes, the initial category and the final category of kids have been considered on the basis of their Baseline and Endline scores.
- Based on this, we have further classified the learners into Achiever, Intermediate and Remedial learners.

1. The limits are defined for this categorisation based on the same sample set, based on Baseline Scores, as is the usual practice.
2. The benchmarking has been done based on half a standard deviation from the mean of the Baseline scores.



Standard Deviation (SD): SD is a measure of the dispersion of the student scores from the mean. A low/small SD indicates that the student scores are closer to the mean whereas a high/large SD indicates that the data is spread out over a large range.

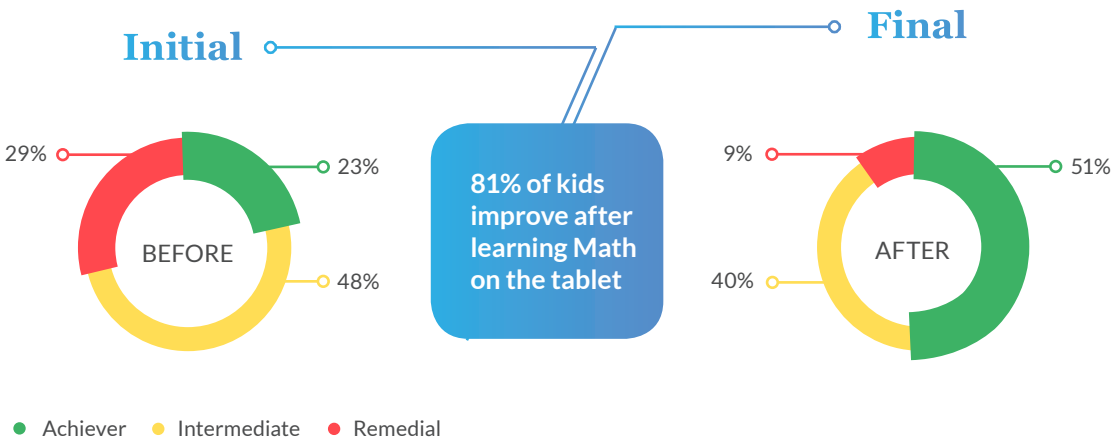
4.1 Math



This data is plotted for 35,782 children.

4.1.1 Movement between Categories

- In order to showcase aggregate learning outcomes, the Initial and the Final categories for each child have been considered on the basis of their Baseline and Endline scores.
  1. Initial Category (Before Tablet-based Learning) – As per their scores in the Baseline assessment.
  2. Final Category (After Tablet-based Learning) – As per their scores in the Endline assessment.



The learner categories are divided on the basis of Baseline scores for all kids, and their movement is studied on the basis of average Endline scores.

4.1.2 Movement within each Category

Now, we look at the movement of children within each of the three learning categories.

- It is possible for children in a category to move upward, or downward, category-wise.
- For children who remain in the same category, it's possible for their scores to increase or decrease.
- We also analyse the average Baseline scores, average Endline scores, and average improvement for the same category, and the categories above this category, as annotated beside the donut plots.

Initial Categories have been considered based on Baseline Assessments, the category transition post tablet-based learning has been shown for all the three categories based on their scores in the corresponding Endline Assessments.

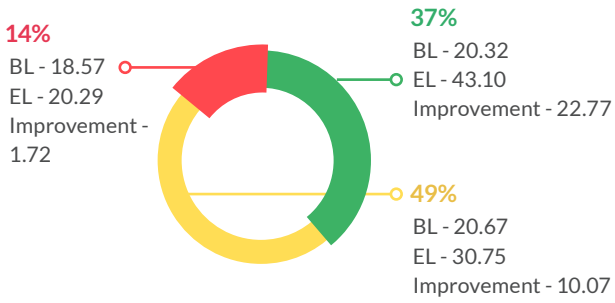
For example,

Before the Program	After the Program
Baseline Score: 15	Endline Score: 65
Category: Remedial Learner	Category: Achiever
Improvement in Performance: 65 - 15 = 50	

It can be fairly concluded from the data that the program is most effective for Remedial and Intermediate Learners.

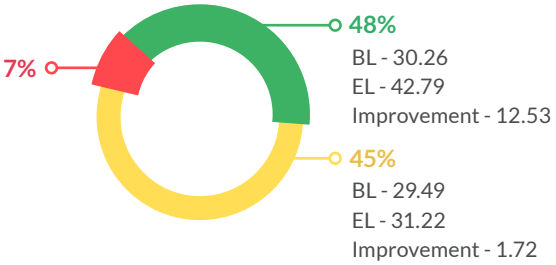
Initial Category (BL - Baseline, EL - Endline)

1. REMEDIAL LEARNERS



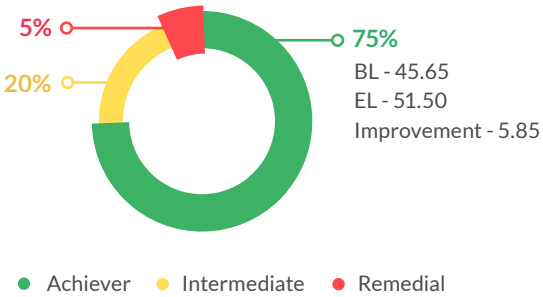
96% of the Remedial Learners improve, with 86% shifting to better learning categories.

2. INTERMEDIATE LEARNERS



82% of the Intermediate Learners improve, with 48% shifting to better learning category.

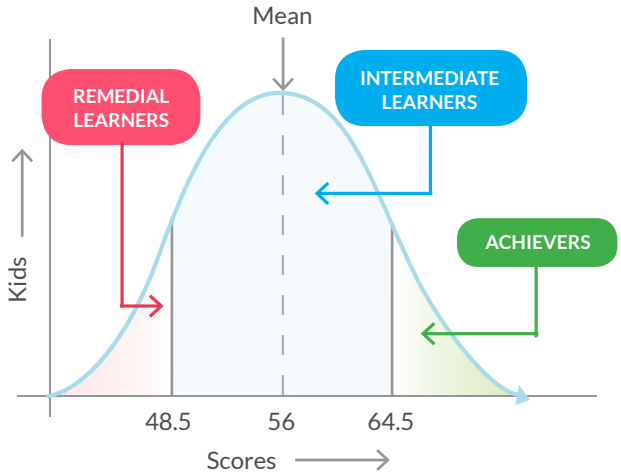
3. ACHIEVERS



59% of the Achievers improve within the same category.

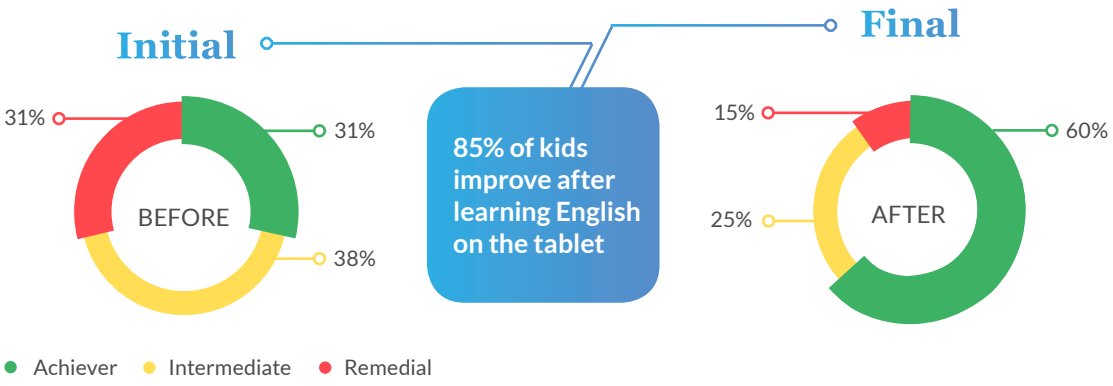
While moving to better Learner Categories always means better performance, lot of Learners improve while staying in the same category. For example, out of 14% of Remedial Learners, 10% improve, but are still categorised as Remedial Learners.

4.2 English



4.2.1 Movement between Categories

- In order to showcase the learning outcomes, the initial category and the final category of kids have been considered on the basis of Baseline and Endline scores. They have been further classified as Achievers, Intermediate and Remedial learners, as shown below.
- The division of data based on learning categories has been done in the same way as that for Math.

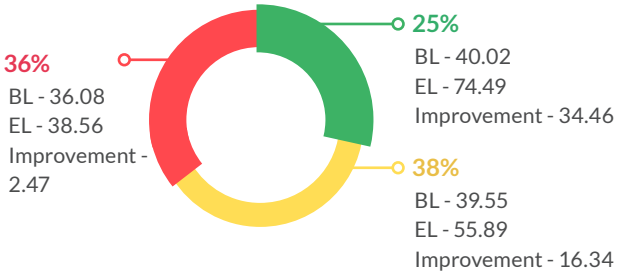


The learner categories are divided on the basis of Baseline scores for all kids, and their movement is studied on the basis of average Endline scores.

4.2.2 Movement within each Category

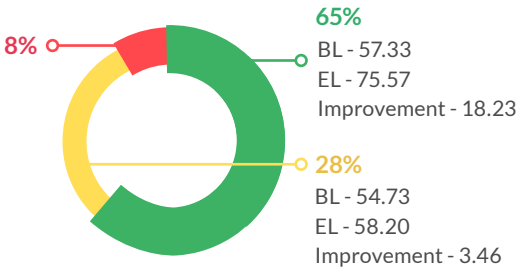
Initial Category (BL - Baseline, EL - Endline)

1. REMEDIAL LEARNERS



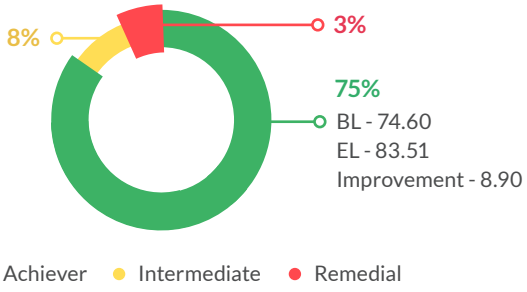
88% of the Remedial Learners improve, with 63% shifting to better learning categories.

2. INTERMEDIATE LEARNERS



87% of the Intermediate Learners improve, with 65% shifting to better learning category.

3. ACHIEVERS



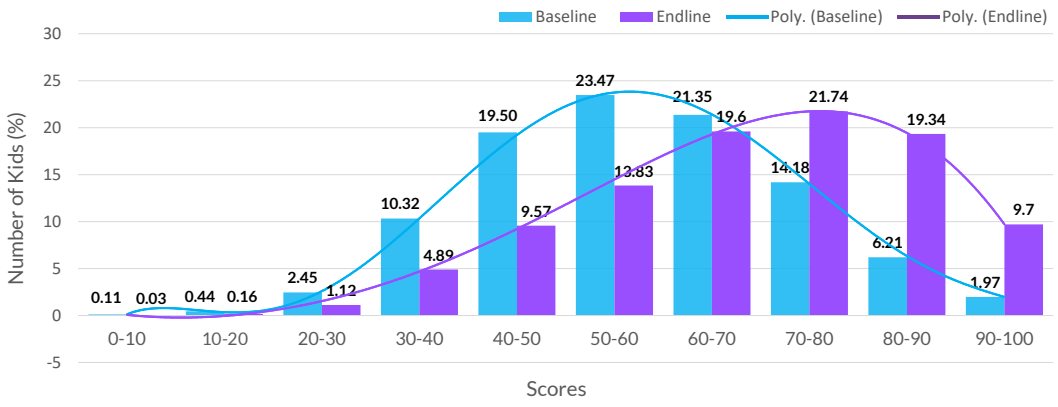
81% of the Achievers improve within the same category.

While moving to better Learner Categories always means better performance, lot of Learners improve while staying in the same Category. For example, out of 36% of Remedial Learners, 25% improve, but are still categorised as Remedial Learners.

4.3 Score (Frequency) Trends

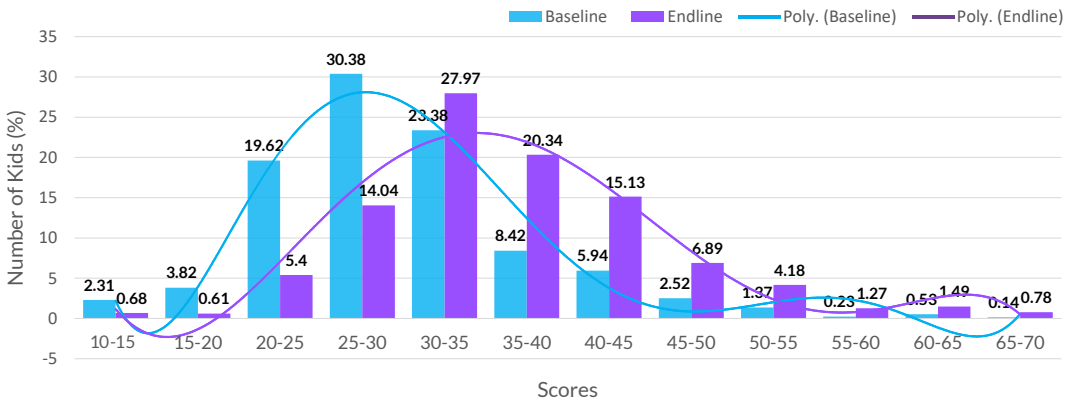
In this section, kids have been distributed on the basis of their Baseline and Endline assessment scores. A clear shift in the frequency curve is observed, denoting the improvement in performance of kids before and after Nudged learning.

1. Subject: English | Distribution of Kids (%)



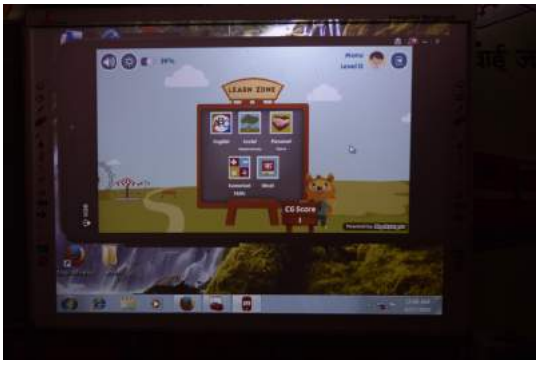
The percentage of kids scoring more than 70 has increased from 22.36% in Baseline to 50.78% in Endline.
The percentage of kids scoring less than 40 has decreased from 13.32% in Baseline to 6.2% in Endline.

2. Subject: Maths | Distribution of Kids (%)



The percentage of kids scoring more than 40 has increased from 11.03% in Baseline to 30.69% in Endline.
The percentage of kids scoring less than 20 has decreased from 7.18% in Baseline to 1.56% in Endline.

*Only the data of kids from Hindi medium locations has been considered.



Tab-Lab for differently-abled kids in Sirsa, Haryana.

Saksham seeks to achieve grade-level competency for at least 80 percent of school-going children in Haryana. Well, this is the attitude that our nation needs!

5 Analysis I: Grade Specific Analysis- Grade 6

5.1 Learning Behaviour

- Now, let's look at the Learning Outcomes data for Grade 6 children.
- The reason why we have considered Grade 6 separately is because; firstly, it has the maximum number of students, and secondly, all these students are using a digital tool for learning for the first time.
- In order to understand their learning behaviour, we have used the same tools for analysis as in the last two sections.
- We infer that the children in Grade 6 improve more than the children in other grades, as the learning gaps only increase after 6, making it more difficult to bridge these gaps.

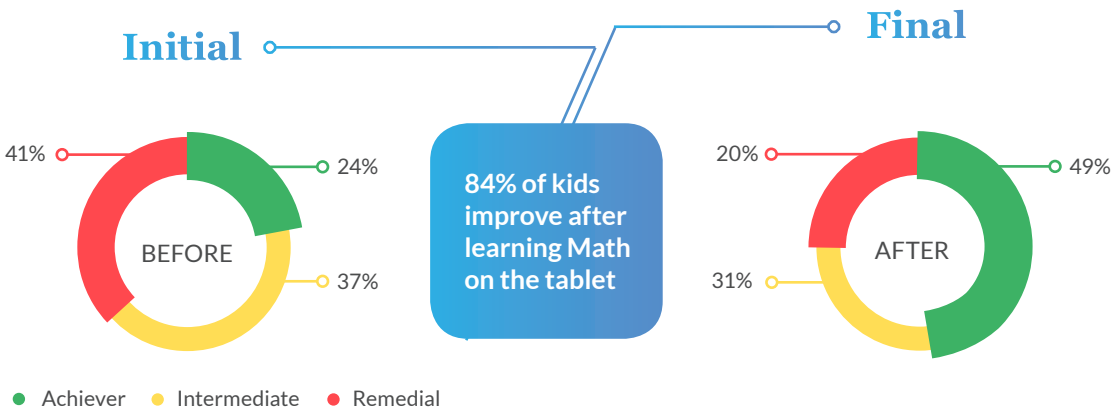
> **We recommend the earliest possible introduction of tablet-based learning to bridge learning gaps most effectively.**

5.2 Math

1. The given data shows the average improvement in the performance of students after being a part of the Program.
2. We have shown this entire data by breaking it into 3 sections as per their scores in the Baseline assessment; (Achiever, Intermediate and Remedial).
    - This defines the 'learner category'.

3. Each section again contains the same 3 sub-sections, which are based on their final scores (Endline assessment).
    - This defines the 'final category'.
    - When compared to the students of the other two categories, Remedial Learners have shown maximum improvement.

5.2.1 Movement between Categories

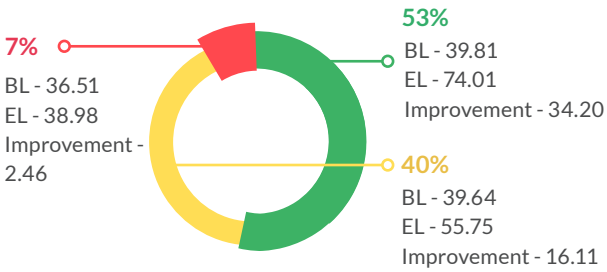


> **The learner categories are divided on the basis of Baseline scores for all kids, and then their movement is studied on the basis of average Endline scores.**

5.2.2 Movement within each Category

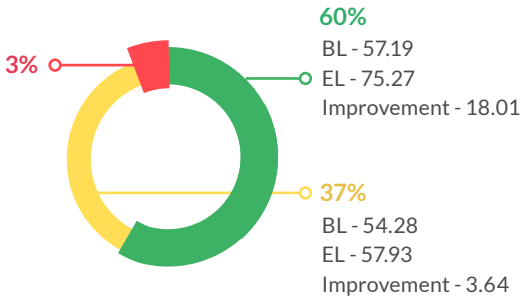
Initial Category (BL - Baseline, EL - Endline)

1. REMEDIAL LEARNERS



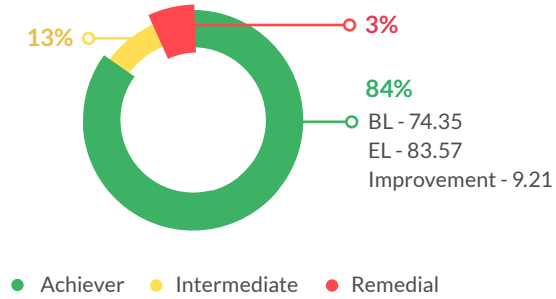
> **98% of the Remedial Learners improve, with 93% shifting to better learning categories.**

2. INTERMEDIATE LEARNERS



87% of the Intermediate Learners improve, with 60% shifting to better learning category.

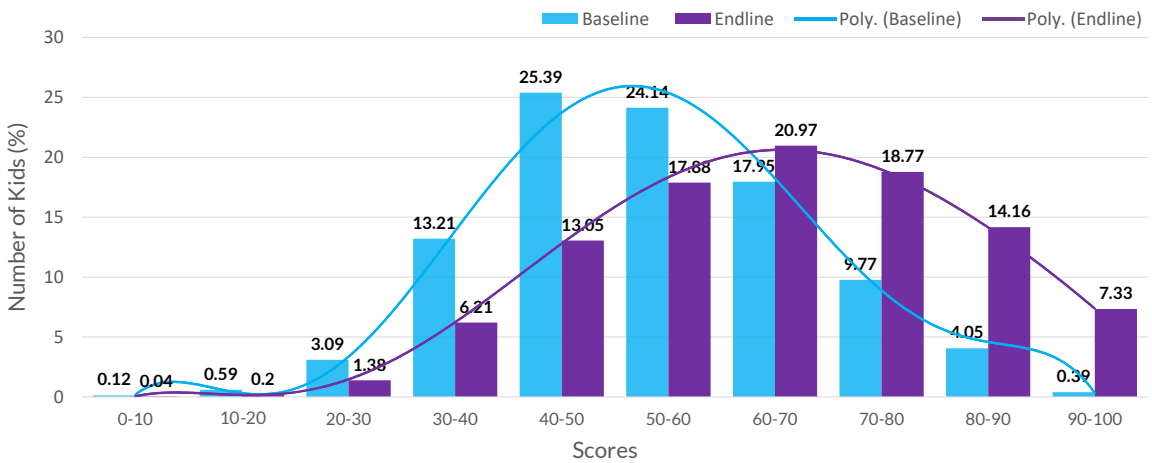
3. ACHIEVERS



66% of the Achievers improve within the same category.

5.2.3 Score (Frequency) Trends

Distribution of Kids (%)

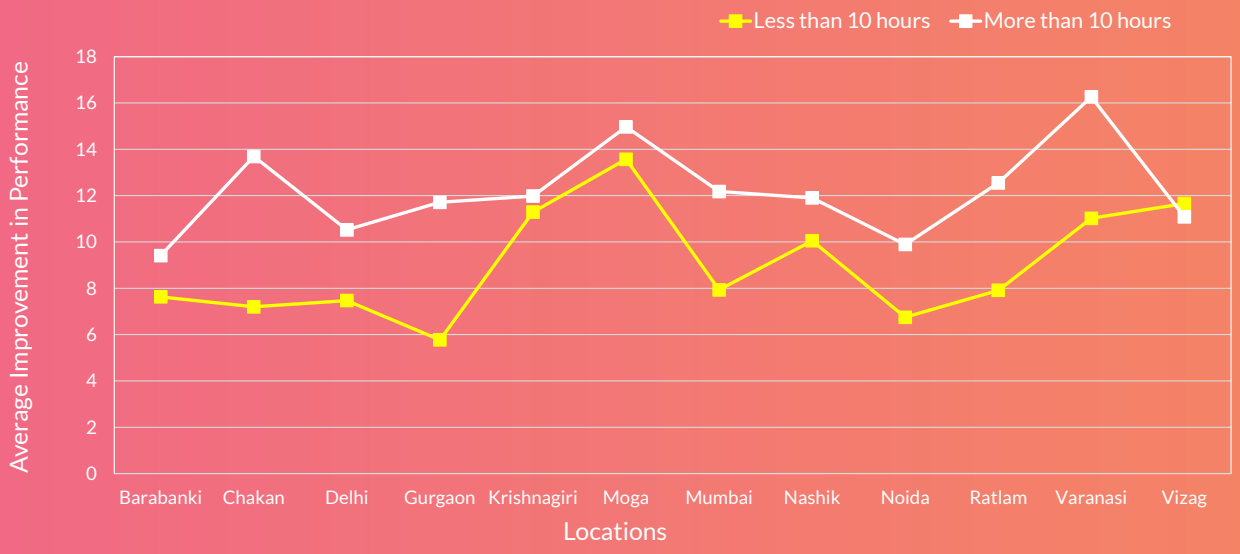


The percentage of kids scoring more than 70 has increased from 14.21% in Baseline to 40.26% in Endline.
The percentage of kids scoring less than 40 has decreased from 17.01% in Baseline to 7.84% in Endline.

6 Analysis II: More Tablet Usage = More Learning

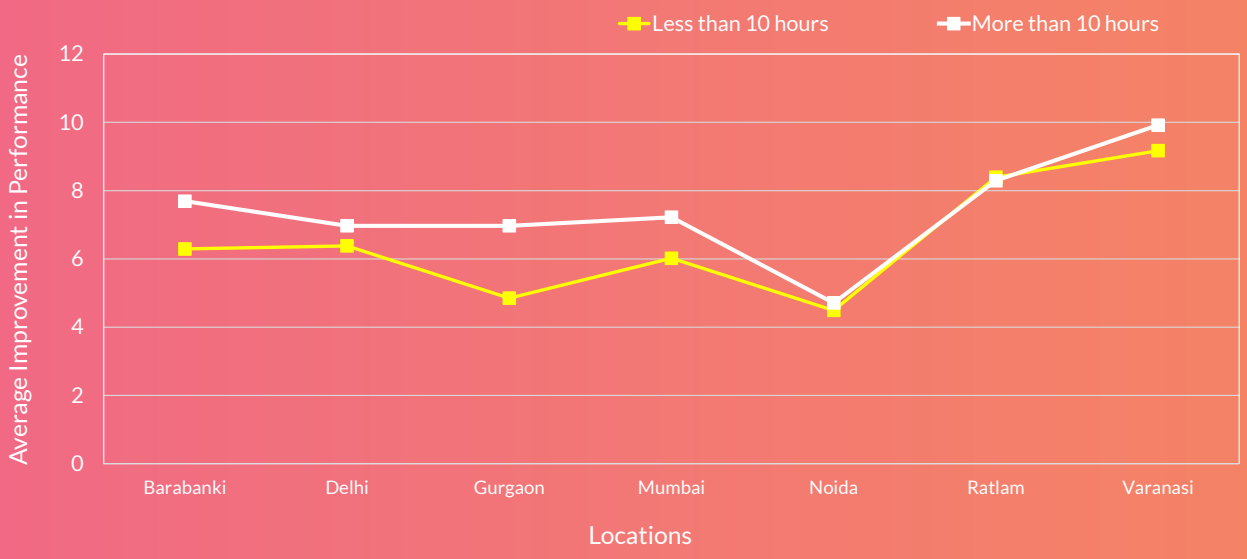
- This section shows a comparison in the performance of kids who have spent more than 10 hours on CG Slate (per subject), with the rest of the kids for both English and Math.
- A significant improvement in the performance of kids could be seen when they spend more than 10 hours on a subject on CG Slate. In most of the cases, the improvement is more than 30-40%.

More Tablet Usage = More learning (English)

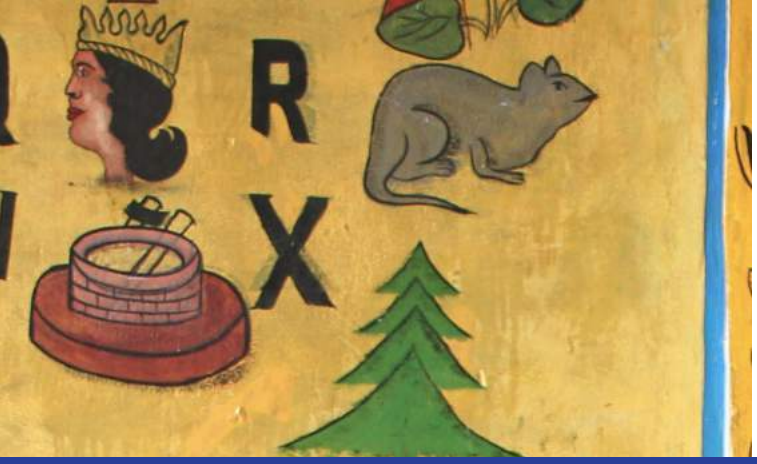


1. A major improvement in performance of kids has been observed in Gurgaon (103.08%).
2. Average improvement when time < 10 hours: 5.77 performance points
3. Average improvement when time > 10 hours: 11.71 performance poins

More Tablet Usage = More Learning (Math)



1. A major improvement in performance of kids has been observed in Gurgaon (43.84%).
2. Average improvement when time < 10 hours: 4.85 performance points
3. Average improvement when time > 10 hours: 6.97 performance points



7 Analysis III: Program vs. Regular School

Content is same for all 5 Grades (Level-based Content)

It is observed that the average Baseline scores increase commensurately with the grade.

↓

Horizontal and Vertical Delta

Vertical Delta: Denotes improvement without tablets.

Horizontal Delta: Denotes improvement along with CG Slate.

↓

Improvement Attributable to Tablets

The difference between the improvement with CG Slate and performance without the tablets.

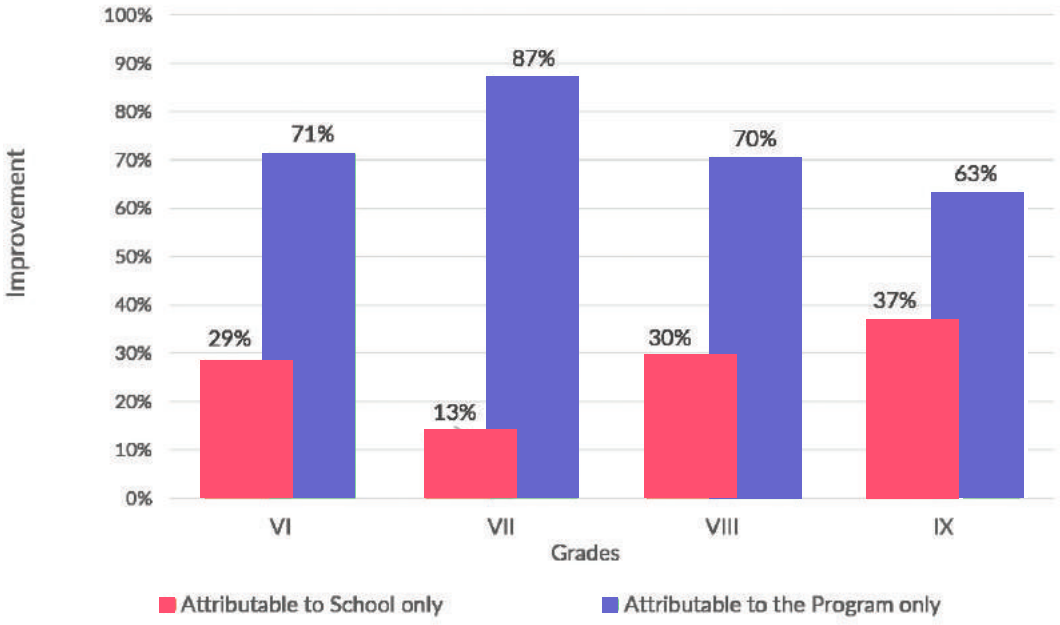
Since every child is learning through this content for the first time, the difference between the average Baseline score for a Grade and the next could be seen as what she would have learned in school in the previous grade, without the CG intervention.

7.1 Improvement Attributable to the Program

We have made a comparison of the performance of students based on their scores before and after learning through CG Slate, and the difference in grade levels, in order to figure out the learning improvement which was solely due to the program.

Grade	Average Baseline	Average Endline	Horizontal Delta	Vertical Delta (Attributable to School)	Improvement Attributable to the Program*
VI	53.01	63.80	10.79	0.00	7.69
VII	56.11	67.34	11.23	3.10	9.78
VIII	57.56	68.99	11.42	1.45	8.05
IX	60.94	71.48	10.54	3.38	6.66
X	64.82	74.48	9.66	3.88	-

*Improvement attributable to the Program is calculated as the difference between the Horizontal Improvement of the current class and the Vertical Delta (Attributable to School) of the succeeding class.



8 Location-wise Analysis of Attendance, Usage & Learning Outcomes

8.1 Assumptions

- In order to analyse each location and compare it with all the other locations, we have set certain benchmarks as per the specific requirements of this program.
- The values which are marked red ● indicate poor performance and require special attention. We have given those a score (-1).
- The values which are marked green ● indicate good performance. We have given those a score (+1).
- The average values for metrics are not marked at all and carry no score.
- In the end, based on their overall performance, a comparison of all the locations has been done.
- This analysis was done based on this partner's requirements, and such custom analyses is an area of expertise, and would be a part of our large (>1000 tablets) programs.

8.2 Attendance and Usage

- The benchmarking of minimum attendance has been done based on average time required to complete the entire syllabus.
- Special attention is required where the number of kids with zero attendance and less than 30% attendance are high, as it would directly affect the overall performance of the kids, and in turn, the performance of the location.

Location	No. of Kids	Zero Attendance Kids %	<30% Attendance Kids %	Average Working Days	Average Attendance %	Average Time (Hours)
Barabanki	2109	8.30	23.09	144	51.01	30.13
Chakan	3670	0.05	2.51	132	84.28	36.67
Delhi	5014	18.07	31.15	154	47.13	24.58
Gurgaon	2326	3.27	11.48	160	61.90	33.39
Krishnagiri	2876	5.60	10.29	92	78.50	25.28
Moga	4638	0.00	1.94	142	68.64	22.68
Mumbai (Hindi)	2416	5.88	22.76	105	58.33	15.50
Mumbai (Marathi)	2204	2.90	12.57	98	68.92	12.73
Mumbai (Urdu)	1752	15.41	21.75	90	63.09	11.35
Nashik	4791	0.00	2.38	132	82.37	35.02
Noida	2543	0.24	5.90	148	69.95	27.06
Ratlam	5158	3.63	11.52	145	67.40	30.68
Varanasi	1942	0.62	19.05	159	57.05	22.49
Vizag	3422	0.58	1.61	101	84.40	14.59
Grand Total	44861	4.51	11.78	131	68.31	26.33

8.3 Completion

- The performance of each location is marked good or poor based on time spent on the tablet in comparison to the average time that is required to complete the syllabus.
- The second parameter that is used is syllabus completion.
- The locations where both usage time and syllabus completion are very low need our attention, as it would affect the learning outcomes of each child and will hamper the overall performance of the program.

Location	Average Attendance %	Average Time (Hours)	Average Completion %
Barabanki	60.65	15.14	33
Chakan	84.52	33.67	57
Delhi	60.27	13.66	32
Gurgaon	63.81	20.20	35
Krishnagiri	83.02	20.71	51
Moga	68.87	19.43	43
Mumbai (Hindi)	63.75	7.93	22
Mumbai (Marathi)	71.69	10.26	29
Mumbai (Urdu)	75.40	9.18	27
Nashik	82.55	28.52	56
Noida	73.09	16.91	35
Ratlam	74.06	17.25	28
Varanasi	59.87	7.87	21
Vizag	86.39	9.42	28
Grand Total	73.52	18.32	38

This data is analysed for the performance of kids in English.

8.4 Learning Outcomes

- The learning of a child is based on the scores of Baseline assessment which are then compared to the scores of Endline assessment.
- The difference between the two is considered as Learning Improvement.
- For maximum children, the improvement is positive, but there are certain students who also show a drop in performance.

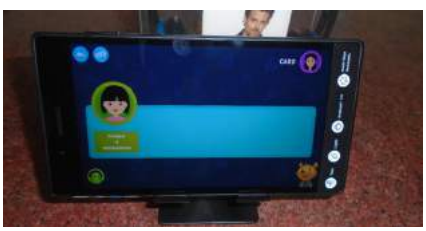
Location	Average of Baseline	Average of Endline	Positive Improvement (% of Kids)
Barabanki	40.95	49.42	76.32
Chakan	70.61	83.64	95.77
Delhi	52.14	61.02	77.57
Gurgaon	54.98	64.89	82.07
Krishnagiri	57.32	69.05	90.81
Moga	61.66	76.07	93.77
Mumbai (Hindi)	54.97	61.65	73.75
Mumbai (Marathi)	59.84	70.54	83.75
Mumbai (Urdu)	56.65	65.99	80.58
Nashik	58.48	70.04	91.57
Noida	54.10	62.65	78.58
Ratlam	39.76	50.19	76.39
Varanasi	49.75	62.18	83.86
Vizag	65.26	76.77	88.15
Grand Total	56.47	67.48	85.42

This data is analysed for the performance of kids in English.

Based on their performance on these parameters, the overall score of each location is calculated as shown below-

Location	Green	Red	Score
Barabanki	1	5	-4
Chakan	8	0	8
Delhi	1	4	-3
Gurgaon	3	2	1
Krishnagiri	4	0	4
Moga	4	0	4
Mumbai (Hindi)	0	8	-8
Mumbai (Marathi)	0	4	-4
Mumbai (Urdu)	0	9	-9
Nashik	7	0	7
Noida	3	1	2
Ratlam	2	3	-1
Varanasi	2	5	-3
Vizag	5	4	1

The idea is to create an environment that engages children and ignites in them a pure love for learning! Have a look at how children engage & study for the first time in the new CG Tab-Lab set-up in Govt. School, Chalaila, Patiala.
Part of the Samruddhi Project, a joint collaboration by CARD INDIA and John Deere INDIA for increasing the access to quality education for the underserved population in India.



Peer collaboration helps children actively learn, while leting them have an individualised approach to learning, and empowers them to evolve as leaders!

9 Conclusion

Based on the analysed data, following conclusions have been derived.

9.1 Improvement in Numbers!

Math

80.73%

Out of 35,782 students, 28,886 have shown positive improvement after being a part of the Program.

7.2%

On an average, the absolute improvement has been 7.2%, with Chakan performing best at 11.07% and Noida performing worst at 4.59%.

29.32%

Remedial Learners (29.32% of all kids) have improved by 13.7% on an average, which translates to 67.6% if normalised over the average Baseline score.

47.72%

Intermediate Learners (47.72% of all kids) have improved by 6.14% on an average, which translates to 20.56% if normalised over the average Baseline score.

English

85.42%

Out of 38,386 students, 32,789 (85.42%) have shown positive improvement after being a part of the Program.

11.01%

On an average, the absolute improvement has been 11.01%, with Moga performing best at 14.01% and Mumbai (Hindi) performing worst at 6.68%.

31.29%

Remedial Learners (31.29% of all kids) have improved by 15.92% on an average, which translates to 41.42% if normalised over the average Baseline score.

37.36%

Intermediate Learners (37.36% of all kids) have improved by 11.53% on an average, which translates to 20.46% if normalised over the average Baseline score.

9.2 Some Red Flags!

There are total 44861 kids enrolled in the Program.

4.5%

There were 2021 kids (4.5%) with Zero Attendance

79.76%

Only 35,782 kids (79.76%) have completed at least 1 chapter in Math

85.57%

Only 38,386 kids (85.57%) have completed at least 1 chapter in English

The location-wise variations are huge, which means that data could be leveraged better to improve outcomes.

- While Gurgaon reports 160 Working Days, this value for Mumbai (Hindi) is just 105. Krishnagiri, despite only 5 Working Days a week and a late start, has 92 Working Days.
- While Chakan has just 0.05% kids with Zero Attendance, Delhi has 18.07% kids with Zero Attendance.
- While Chakan has 97.03% kids having finished at least 1 chapter in Math, this number for Mumbai (Urdu) is a paltry 50.74%.
- While Chakan has 99.26% kids having finished at least 1 chapter in English, this number for Delhi is just 67.21%.
- While Chakan reports average usage of 36.67 hours per child, this value for Mumbai (Urdu) is only 11.35 hours.
- Usage time is clearly not linked to electricity availability, as both Ratlam and Barabanki report average usage of over 30 hours per child.

10 Some (Proposed) Goals for AY 2018-19

Looking at the flow of Program (AY 2017-18), we had proposed the following goals in order to improve Program efficacy.

160 Working Days
over the entire year for all locations

Less than 3%
of kids with Below 30% Attendance

Less than 0.5%
of Zero Attendance kids

Average Tablet Usage of 60 hrs for the year, which means 20 hrs for a quarter, and close to 7 hours per month.

- 40 hours of Math and 20 hours of English for the year, approximate 4.5 hours of Math and 2.5 hours of English per month.
- 80% average completion for Math for each location, 27% for each quarter, and 9% for each month.

(Qualitative Goal) Reduce location-wise variance for all key parameters.

- Less than 10% variation from the average values for each key metric.
- Assess location-wise performance on these metrics monthly to ensure this qualitative goal.

11 Third Party Analysis: Gray Matters India*

Michael & Susan Dell Foundation (MSDF) is one of the investing partners of ConveGenius. MSDF has commissioned Gray Matters India (GMI) to carry out independent learning outcome assessments to measure the impact of ConveGenius' program in community centres under this Program.

Gray Matters India conducted Baseline and Endline assessments of students in classes 7 and 9 in Math in Hindi and English Language in the academic year 2017-18. The Baseline assessment was conducted in October 2017 and Endline assessment was conducted in February 2018. This report presents the comparative findings between Baseline and Endline.

11.1 Sampling

There are no control schools assessed as a part of the study for comparison with intervention.

Student learning outcome scores of the intervention are compared with the APS Benchmark (mean scores of students from Affordable private schools assessed by GMI outside this study).

Following are the number of students assessed under each category in the academic year 2017-2018:

Group	Medium	No. of Communities	Class 7 - No. of Kids		Class 9 - No. of Kids	
			Baseline	Endline	Baseline	Endline
Intervention	Hindi	36	472	416	440	382

*Most of the content/plots under this chapter pertaining to GMI solely is reproduced from their own reports, and is attributed to them as their intellectual property.

11.2 Assessment Instruments

Gray Matters India used class-specific standardized assessment instruments for English language and Math in Hindi that were developed in partnership with Australian Council for Educational Research (ACER). These class specific test instruments are developed based on NCF 2005 framework as prescribed by National Council of Educational Research and Training (NCERT).

All the questions in the test instrument are MCQ (multiple choice questions) with one right answer for each question. Each test instrument has 30-40 test items depending on the class tested. The test duration is between 45 to 60 minutes.

1. Math in Hindi

The tests were designed to test students for their conceptual understanding and problem-solving abilities using numerical, picture and paragraph-based problems.

2. English Language

The English test instruments were designed to assess students' reading and comprehension skills. It features a range of text types like factual, prose, fiction, persuasive and narrative texts.

11.3 Methodology Adopted

For this study, GMI used the Rasch Model to analyse and report the results. The principles that underpin this methodology are well established in national and international studies that have been applied by GMI in schools across India.

The Rasch model allows estimates of students' abilities in an area of learning to be placed on the same scale as estimates of the difficulty of test items. This model also allows the difficulty of items from different test forms to be brought together on the same scale. This means that it is possible to examine the relative achievements of students from different grade levels, and to monitor the achievements of individual students and cohorts of students over time.

Usage of Scale Score

Across the world, standardized tests are widely used in K–12 to provide a common basis for evaluating and comparing test-takers' abilities in a specific content area. They are administered and scored in a predetermined manner that is consistent for all test takers. Further, testing programs often report transformed test scores, which are called scaled scores, rather than reporting percent-correct scores.

In line with this methodology, GMI has reported transformed test scores obtained directly from a test as a scale score for this study. This standardization allows scores reported from a test to have consistent meaning for all test takers.

Comparison with APS Mean: APS Mean is mean of student scores in Math and English. It is calculated based on the assessment data collected by GMI in last 3 years. These APSs are private schools in urban areas across India. The sample consists of 4000+ students per grade.

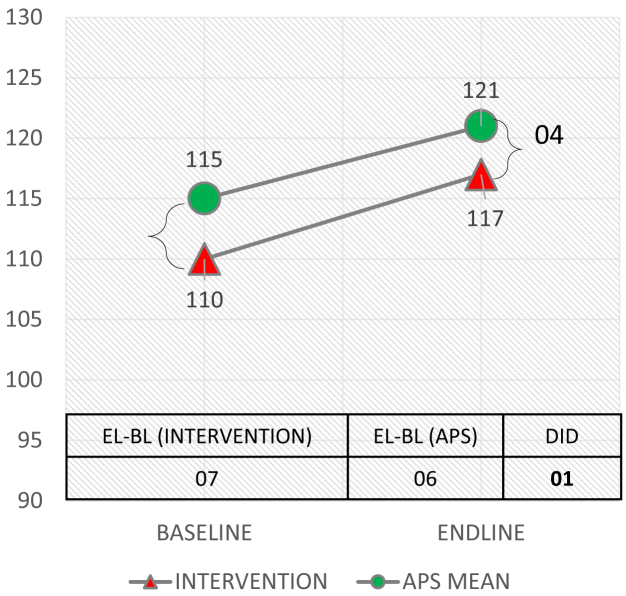
11.4 Math: Grade 9

Key Highlights

Strands/Topics

Numbers/Algebra, Measurement/Geometry and Statistics/Probability

- The students have scored 7 points more in endline than in Baseline.
- Students have performed highest in the Numbers/Algebra strand and needs attention in Measurement/Geometry strand.

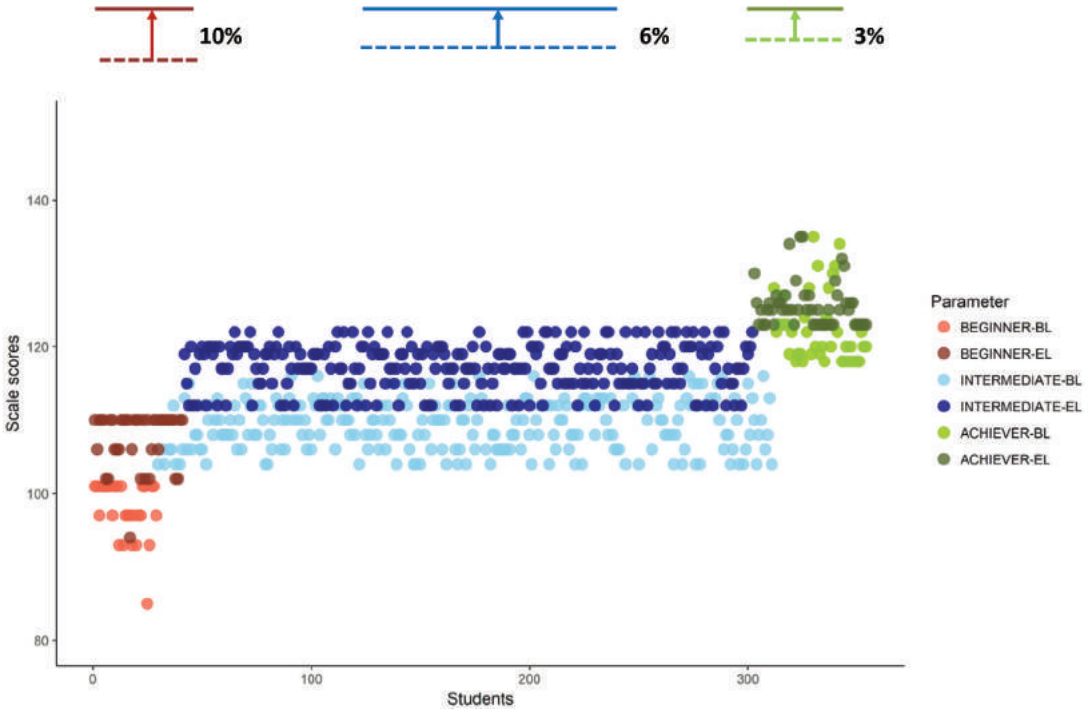


Students in intervention group have gained 7 scale score points compared to 6 scale score points demonstrated by APS.

1. The graph in this page represents the scale scores in Math against APS mean between Baseline and Endline for Class 9 of the intervention group. The difference between intervention & APS mean of Baseline & Endline for Class 9 are displayed beside the brackets.
2. APS means are not a directly comparable cohort to the population od community centres tested in this study. However, it is used as a generalized benchmark to highlight growth achieved by this cohort.

11.4.1 Performance Categories: Baseline vs Endline- Grade 9

INSIGHT: Remedial Learners have demonstrated the highest growth (10%) followed by Intermediate Learners at 6% and Achievers at 3%.

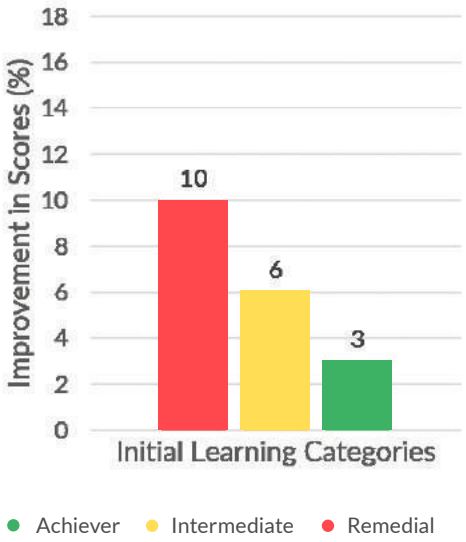


11.4.2 Comparison with CG Analysis

INSIGHT:

Remedial Learners show the maximum growth of 10% (CG Analysis: 17%), followed by Intermediate Learners at 6% (CG Analysis: 7%) and Achievers at 3% (CG Analysis: 3%).

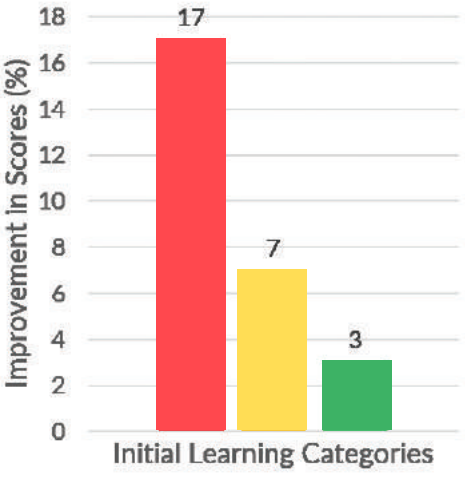
Improvement - GMI Analysis



Grade 9 (Math)

This data is analysed for 36 community centres (382 kids).

Improvement - CG Analysis



Grade 9 (Math)

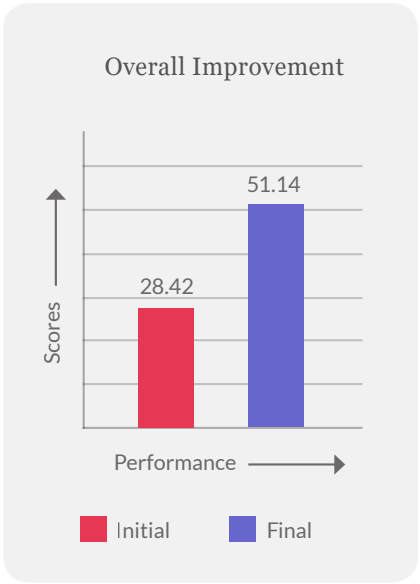
This data is analysed for all Hindi locations (1999 kids).

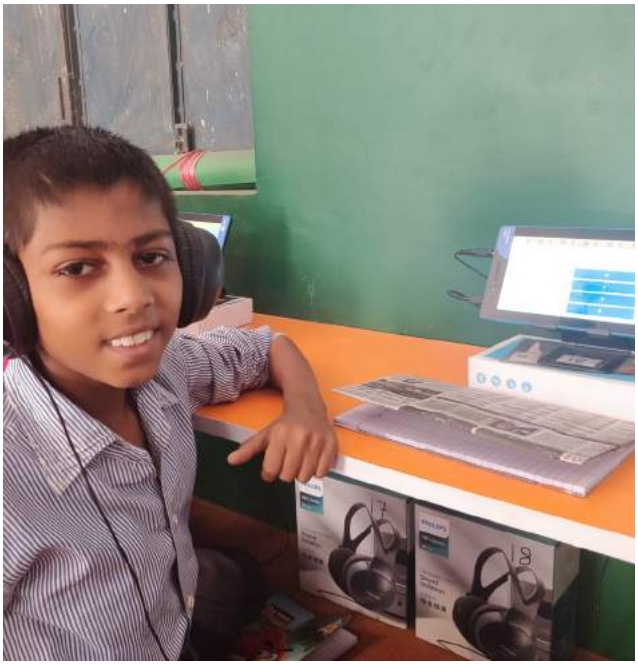
A Doorway to Happiness

One of the many Success Stories

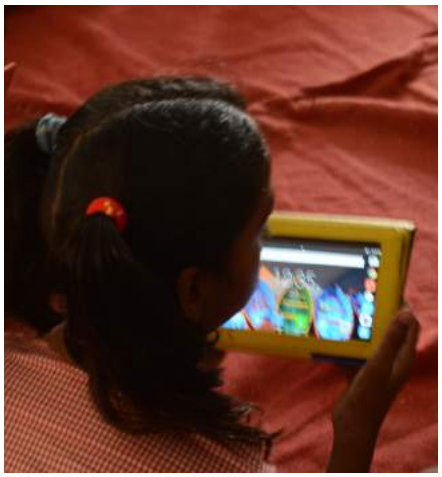
Our intervention has helped thousands of students, one being Pushpa. Her transformation is laudable and it motivates us to work harder to bridge the extant learning gaps of countless kids in the hidden pockets of the country.

Child's Name	Time spent on learning through CG Slate
Pushpa	37.62 hours
Grade	Syllabus Completion
IV	19 chapters, 95%
Location	Initial Score
Ratlam	28.42 (Category: Intermediate)
Attendance	Final Score
97.58%	51.14 (Category: Achiever)
Subject	Overall Improvement
Math	22.72





A picture of a Tab Lab from one of our interventions with the Kaivalya Education Foundation in Gurgaon, Haryana.



A picture of a classroom from one of our interventions with the Naandi Foundation.

Concluding Remarks

Integrating technology in the Indian landscape has always been tricky across various domains. Users on the ground, and the facilitators who adapt technology, undergo a behavioral change, which is often glacial, before they fully embrace such changes to their respective ecosystems. A fear of the unknown, which is personified by the all-encompassing ability of technology, hence, needs to be managed through continuously evolving processes and their adoption. This means that working with each of the constituents of the hierarchy to assuage their apprehensions, to bring about a favorable perspective on how automatic and data-driven feedback loops would help them further leverage their strengths, is critical to the success of any technology integration into predominantly people-driven value chains.

Education, in particular, has been traditionally driven by a 'leader' of the charismatic kind, borrowing from the Trait Theories of Leadership, who not only teaches, but also facilitates the process of learning by bringing about a psychological change in the receiver, making him/her receptive to stimuli that propel the learning process forward. This aspect of education is often overlooked by product companies trying to plug in their technology solutions, with specific customizations, into the traditional program structures that pervade the Indian Education system, which have not only proved to be resilient to the vicissitudes of time and technological innovation, but have also been hesitant to see a complete overhaul of their existing models.

ConveGenius, as a technology-led social enterprise, works more on the people and their thought processes, rather than developing mere technology-enabled Programs with a closed mindset. We believe that people are at the center of it all, with technology acting as a catalyst towards honing their existing capabilities and streamlining outcomes with the larger perspective in mind.

Each qualitative and quantitative data point is essential feedback to designing the 'nudges' that are imperative in our Program Design, and that's the motto we have internalized through working with various partners of ours. **'Getting our hands dirty' is the operational outcome of the said motto!**

I would like to personally credit the leadership and the implementation teams of the partners we have had the good fortune of working with, who have brought about this change in our own mindset, where, as naive techies, we initially believed in how technology would be the beginning and the end of it all in education! In particular, I would like to mention the team of Project Nanhi Kali as the one that I owe the most to, in shaping what we believe in as an innovator working to ameliorate the state of education in the country.

> As a multi-input, multi-output sensing mechanism, we have seen how technology could be used to design 'nudges' that fit in like a glove with the existing processes, bridging the gap between the inherent potential, and the observed outcomes, bit by bit, particle by particle, continuously evolving through innovations by all the stakeholders in the system. For us, a sheet of paper unutilized, a minute extra to sit back and think about what unfolds in front of you, a minuscule but noticeable spring in a step, a smile, is all impact that's worth fighting for!

This change management is a slow process, and we're committed to making it a steady one! The results of this study, which takes into consideration data for one year, is actually five years of learning, of 'getting our hands dirty', of surviving, of falling and getting up from the ground and dusting ourselves and racing towards our vision, of failing, of learning from failures, of overcoming fears of failure, of redefining our path and not our goals, and enjoying the journey with our sight on an India of the future, an India that realises its true potential, with us contributing a grain of sand to the behemoth that we're destined to be; an equitable, conducive India which lets no constructive dream go unrealised!

I humbly request everyone reading it to converse with us, to help us learn, to partner in whatever capacity possible, towards helping us make this dream a reality. We promise undivided attention, and strong coffee to stimulate our conversations!

I conclude by quoting Faiz Ahmad Faiz, considered to be the last few of the Urdu poets in the classical mould, 'NahiN nigaah meiN manzil to justjoo hi sahi, NahiN wisaal muyassar to aarzoo hi sahi!', which loosely translates to 'If the goal is not in sight, for mere desire I'd settle, If a glimpse is too much to ask, for mere longing I'd settle', which for me is a battle cry for persistence, rather than a resounding clamour of defeat!

Ashok Subramanian P,
COO and Director, ConveGenius

Glossary of Terms

Pre-Test: The performance of a child in a chapter prior learning through CG Slate.

Post-Test: The performance of a child in a chapter after learning through CG Slate.

Baseline Score: Baseline (assessment) score for a child is defined as the average of Pre-Test scores for all Chapters which have a Post-Test score.

Endline Score: Endline (assessment) score for a child is defined as the average of Post-Test scores for all Chapters attempted.

Improvement: Difference between the Endline score and Baseline score.

Percentage Improvement: Improvement with respect to the Baseline score.

Initial Category: As per the score in the Baseline assessment (Before Tablet-based Learning).

Final Category: As per the score in the Endline assessment (After Tablet-based Learning).

Mean: Simple or arithmetic average of a range of values, computed by dividing the total of all values by the number of values.

Standard Deviation (SD): SD is a measure of the dispersion of the student scores from the mean. A low/small SD indicates that the student scores are closer to the mean whereas a high/large SD indicates that the data is spread out over a large range.

Achievers: Category of learners with score more than half standard deviation away from the mean on the higher side.

Intermediate Learners: Category of learners with score within half standard deviation away from the mean on either side.

Remedial Learners: Category of learners with score more than half standard deviation away from the mean on the lower side.

Horizontal Delta: Denotes improvement along with the program.

Vertical Delta: Denotes improvement only on the basis of school-based learning.

Rasch Model: The Rasch model is a family of psychometric models for creating measurements from categorical data, such as answers to questions on a reading assessment or questionnaire responses.

APS: Affordable Private Schools

APS Mean: APS Mean is mean of student scores in Math and English. It is calculated based on the assessment data collected by GMI in last 3 years. These APSs are private schools in urban areas across India. The sample consists of 4000+ students per grade.

Team ConveGenius

'Brainstorming, discussing, and breaking bread together, definitely builds a great company!'

Committed to bringing equity and excellence in the education ecosystem.

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