मिशन बुनियाद

Mission Buniyaad

A mission to promote digital education in the state

Mission Buniyaad is a digital education program by the Government of Rajasthan focused on improving the learning outcomes of girl students through personalised adaptive learning

राजस्थान स्कूल शिक्षा परिषद
स्कूल शिक्षा विभाग, राजस्थान सरकार

ConveGenius
Nudging Education

KAIVALYA
EDUCATION FOUNDATION

CHILDREN'S INVESTMENT FUND FOUNDATION

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Executive Summary

India has more than 128 million girl students enrolled in the public school education system. More than 75 years after independence, gender parity in school education remains a dream. More than 3.3% of girls drop out of school after class 8. This is significantly higher than the corresponding percentage for boys.

Some of the reasons for this are learning deficits from earlier grades, lower educational support at home and poor education levels of many parents. Given these barriers, girls lose confidence, fail board exams and drop out of school. These reinforce community prejudices against girls' education. Girls are at higher risk of child marriage and early pregnancy, especially in Rajasthan

Reducing drop-out rates at these critical points is essential to retain girls in school, building their confidence, and breaking social norms.

These systematic issues impact the learning outcomes significantly. As per the Annual Status of Education Report (2018), nearly 27% of Grade 8 children are unable to read a Grade 2 book, and more than 50% of Grade 8 children are unable to do Grade 2 level arithmetic. This imposes multifaceted challenges in the education system. In the past ten years, we have built schools and managed to get children to attend school regularly. However, we stand amidst a learning crisis in the public school education system due to the COVID-19 pandemic adding to the challenges and temporarily disrupting education for 250 million+ students in India.

Even as online education started, more than 40% of public school students did not have access to a smartphone 1 . This was the case, especially for lowincome and rural students.

However, at the same time, we also saw a massive increase in the uptake of digital devices in rural areas.

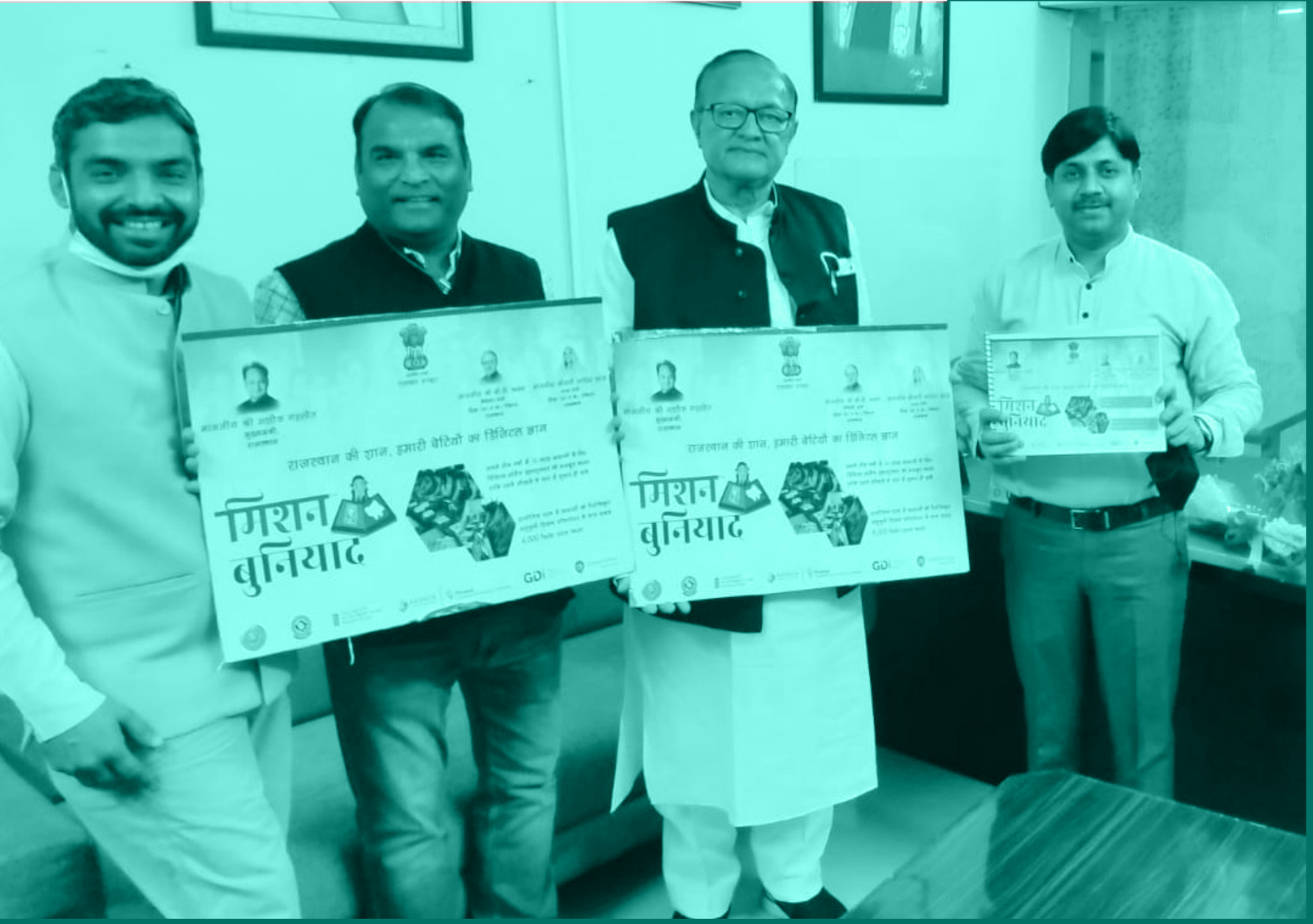
NEP 2020 recommends leveraging digital education to improve outcomes in 2 key areas

1. Learning outcomes: Improving foundational literacy and numeracy through competency-based learning and education and

2. 21st-century skills Intersection of learning, digital literacy, and life skills needed for the 21st-century economy.

Thus, EdTech becomes a crucial link between enrolment and enhanced learning outcomes. To address the issues, the Government of Rajasthan launched a digital education program focused on increasing learning outcomes through personalised adaptive learning with a special focus on girls and reducing the girl drop-out rate in the schools.

A 6-month pilot was conducted under the project to create evidence for the impact created by personalised digital learning. The pilot achieved a staggering 21% increase in learning outcomes over a 4-5 month period. As of September 2022, the project is headed towards a scale-up in all 33 districts, focusing on enabling existing ICT infrastructure, data-backed monitoring, community engagement, and gender-sensitive interventions.



Background

India has the second largest schooling system in the world, with more than 250 Mn students enrolled in the education system. Out of more than 128 Mn, almost 50% are girl students. The education sector in India has been working towards improving the access and quality of education in the past decades. Some notable interventions include the Right to Education, 2009 and the New Education Policy, 2020.

Yet, as per ASER Report 2018, the overall proportion of girls in the 11 to 14 age group who were out of school was 4.1%, while boys remained at 3.3%. This number is higher for girls at 13.5% in the age bracket of 15-16 years.

The challenge of ineffective foundational learning adds to girls dropping out of school. As per ASER (2020) report , In grade 8, only 66% of students can read at least grade 2 textbooks. This number has remained unchanged from 2018, and only 44% of students can solve 3-digit by 1-digit division problems.

Covid-19 exacerbated the impact on learning levels by shutting down schools for the longest period. It shifted offline learning to an online mode of learning. As per a UNICEF report , 80% of students in India reported lower learning levels than when physically at school. It can be attributed to a lack of access to digital devices in the country, with more than 29 Mn students not having access to devices.

Introduction: Rajasthan Education

Rajasthan has more than one crore students enrolled in the education system. The dropout rate for girls between 11-14 is 7.4% which is higher than the national average. Rajasthan is one of the only four states which has a higher drop-out rate than the national average.

When Covid-19 struck, the state started multiple digital interventions to continue education and reach students. But with only a 30-35% smartphone penetration rate, especially in rural areas, digital interventions could not reach the most needed ones. Due to this reason, it became difficult for teachers to reach and monitor the learning levels of students.

"Radhika (name changed) studies in grade 9 in one of the schools in the Karauli district said her studies were halted and replaced by household chores due to economic conditions". It affected Radhika's learning levels as she could not use digital interventions effectively. It is difficult for students like her to cope with the academic gap with limited means"

As per a report by Groupe Speciale Mobile Assciation (GSMA), technology has the potential to solve many challenges related to access, cost, equity and quality of education. Digital Education solutions that use software and hardware to improve classroom education and enable remote education had provided some relief to teachers, students and families struggling to cope with the new reality of COVID-19 and the education crisis in many low or middle-income countries.

To resolve the issues of school dropout , poor learning outcomes and added challenges of Covid-19 on Education, the Government of Rajasthan launched a state-wide digital education program, ***"Mission Buniyaad",*** focusing on increasing girls' learning outcomes and retention rates by using digital education. By ensuring access to digital devices via an adaptive learning model for girls, creating a gender-sensitive environment, and establishing a streamlined data-backed monitoring mechanism, the program aims to enhance the

foundations of education. Mission Buniyaad focuses on improving three crucial outcomes in the education system:

Access

As the smartphone penetration remains low in rural Rajasthan, creating multiple access points becomes crucial for students in govt. schools. More than 3,500 schools have ICT labs that can be re-activated, impacting more than 1,00,000 girls between Classes 8-12

Equity

Rajasthan's unique gender and social landscape largely disadvantaged girls in terms of education and overall quality of life as only 56% of girls are allowed to go for higher studies. Fewer girls can complete their education in senior classes due to social norms

Quality

More than 10,000 ICT labs exist in schools. However, this digital infrastructure is poorly utilised due to outdated specifications of the labs, problems with the operation and management of labs, outdated pedagogical content, and lack of a mechanism to measure the data

Mission Buniyaad Intervention

I. Mission Buniyaad Overview

Mission Buniyaad focuses on increasing girls' learning outcomes by ensuring access to digital devices via an adaptive learning model (for customised teaching) for girls.

Mission Buniyaad caters to improving three crucial outcomes in the education system:

ACCESS

Mission Buniyaad's approach is to enable the most feasible infra-route such as Tablets, ICT Labs, and WhatsApp Chatbot to reach the maximum number of students

EQUITY

Mission Buniyaad wants to build a gender-sensitive environment which leads to an equitable ecosystem for girls in education

QUALITY

Mission Buniyaad aims to provide quality PAL learning content and streamlined digital governance & monitoring processes

Figure 1: Mission Buniyaad Outcomes

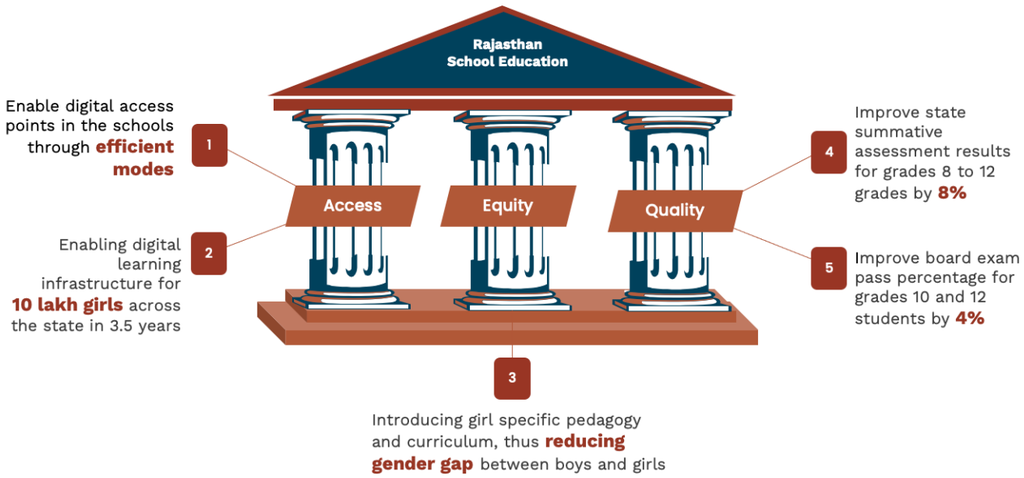
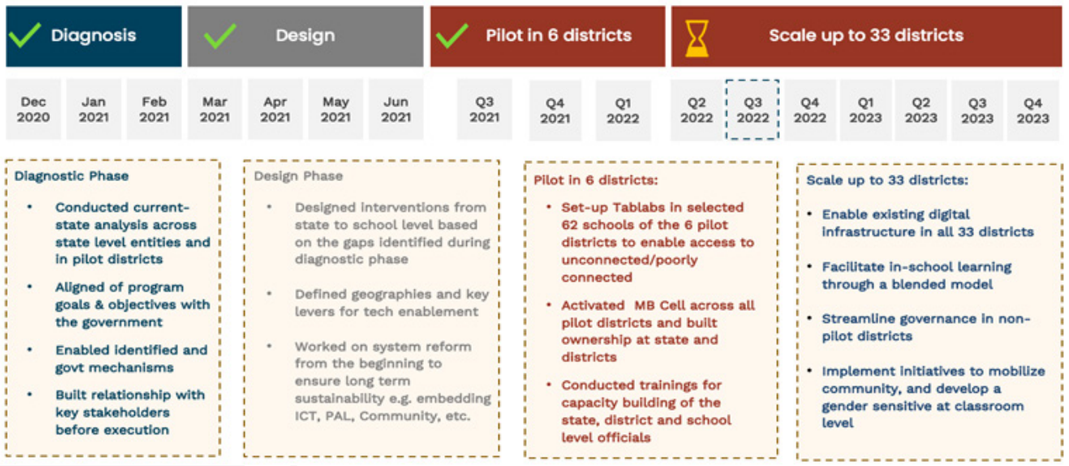


Figure 2: Mission Buniyaad Timeline



The program started in December 2020 with four stages.

It followed a strategic approach by understanding the issues at the ground level, designing the pilot customised to the need of officials, and testing it on-ground

Mission Buniyaad Timeline

DEC 2020 – MAR 2021

Diagnosis
Conduct in-depth on-ground research

APRIL 2021 – JUNE 2021

Design
Design a robust program design with state

JULY 2021 – MARCH 2022

Pilot
Test the Mission Buniyaad Personalised Adaptive Learning (MB PAL) app on the ground in 6 districts covering 62 schools from Nov 2021 to March 2022

SEP 2022 – PRESENT

Scale-up
Move to all 33 districts based on the learnings of the pilot stage

II. Partner's Role

Mission Buniyaad program is a large-scale program which requires expertise in each of the areas of technology, governance, and on-ground implementation. Therefore, to design and implement such a program, four partners came together and conceptualised the idea of increasing girls' learning outcomes. These four partners are:

CIFF CHILDREN'S INVESTMENT FUND FOUNDATION

Children's Investment Fund Foundation (CIFF) is the world's largest philanthropy focusing on improving children's lives. It plays the role of a project funder.

ConveGenius Nudging Education

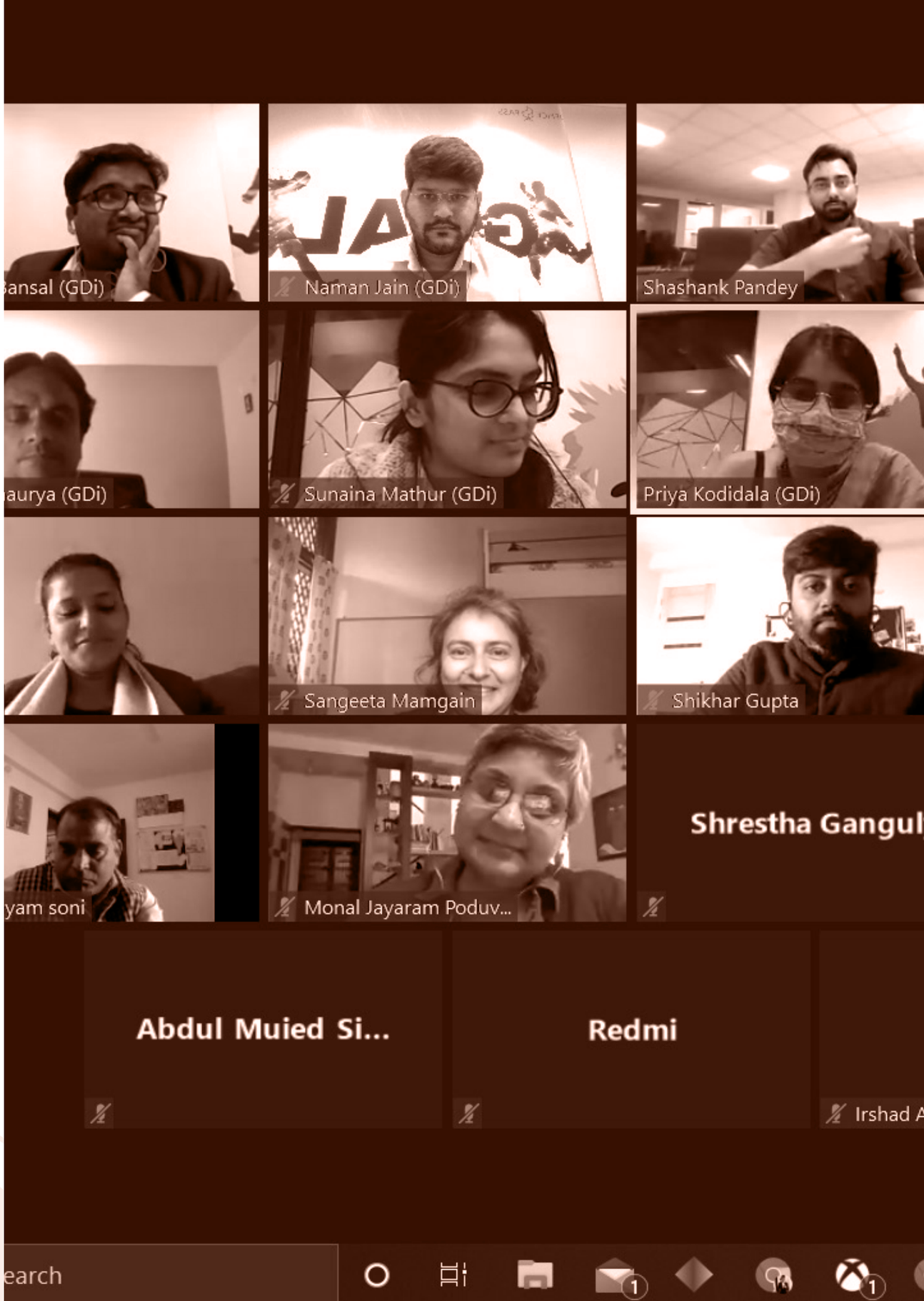
ConveGenius, an ed-tech social enterprise driven to solve educational quality and learning outcomes for children and youth in India, provides expertise in personalised adaptive software used in Mission Buniyaad for learning

GDi

GDi Partners, an impact-driven start-up committed to transform the lives of individuals and communities for an equitable and inclusive world. GDi Partners has expertise in strategically executing such large-scale projects; therefore, it manages the project through a team of consultants.

KAIVALYA EDUCATION FOUNDATION

Kaivalaya Education Foundation, Piramal, an education firm focused on education delivery to the last mile by providing on-ground support. KEF uses a bottom-up approach for providing support in two ways: Gandhi fellowship and Karuna fellowship, where they imbibe the youth with today's skills on the execution on-ground. Gandhi fellows provide on-ground support, and Karuna fellows provide virtual field support.



III. MB Pilot

District Selection for the Pilot

GDi team conducted a thorough diagnosis through fieldwork & primary research, secondary research, and expert interactions. To create a comprehensive selection process, the team ranked all 33 districts against critical factors affecting education.

These were:

- Child Marriage % - Women aged 20-24 years married before age 18 years in rural areas
- Number of Teen Mothers between 15 to 19 years of age
- Female Literacy rate and Overall Literacy rate
- Sex Ratio at Birth
- % of Girl enrollment in schools
- Pass Percentage of girls
- % of children who can read grade 2 text
- % of children who can do division
- Transition rate of girls from elementary to secondary school

Based on the above analysis, the districts were categorised into

1. Poor (such as Sirohi, Jaisalmer, Jalore, and Udaipur)

2. Average (such as Karauli and Bikaner)

3. Better (such as Baran, Dhaulpur, Sikar)

After deliberation with the state, six districts (Karauli, Sikar, Bilwara, Sirohi, Dhaulpur, and Udaipur) were selected for the pilot. Pilot preparation in the 6 districts started in July 2021 (third quarter) to November 2021.

School Selection

The MB pilot was started in 6 districts of Rajasthan, namely Karauli, Dhaulpur, Sikar, Sirohi, Bhilwara and Udaipur, with usage begining in Nov 2021, covering 62 schools reaching 23,000 students (21,000 girls) across districts. The pilot ran successfully from November 2021 to March 2022.

The following factors were considered while selecting the target number of students:

- Focus on all-girls school - The pilot's objective was to assess the impact of PAL on girl's learning. Hence, 90% of the schools chosen were all girl's schools.
- Schools without any active AMC computer Lab - To provide access in remote areas, schools without any lab were chosen
- High enrolment in schools - To reach a high number of students, high enrollment schools were selected.

Execution through Intervention Levers

To reach students in the selected schools, we identified pivotal levers in the education system. Interventions under these levers were executed through the on-ground support team: Gandhi Fellows and Karuna Fellows.

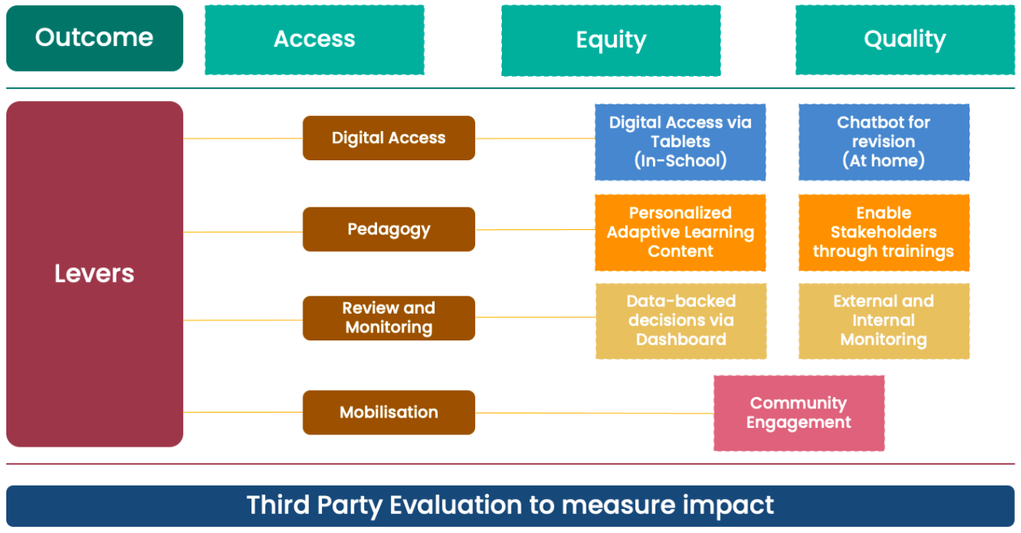


Figure 3: Mission Buniyaad Pilot Intervention Levers

Digital Access via Tablets (In-School)

Based on the diagnosis results, tablets were selected as the appropriate medium to provide access to educational content. We identified several advantages of using tablets. Some of them were:

- Tab labs are easy to set up, maintain and refurbish.

- It creates a familiar tech system environment owing to similar interactivity.

- Tablets have lower unit cost; hence they have a lower set-up cost than a computer lab. Therefore, more tablets can be procured on the same budget.

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Tablabs were set up in 62 schools with the assistance of the on-ground Mission Buniyaad team. The following processes were implemented sequentially at a school level to ensure usage and learning through tab-lab.

- **Distribution:** Tablets were deployed in each school based on the no. of students.

- **Sharing Model:** As the number of procured tablets was lesser than the number of students, a sharing model was adopted.

- **Student Grouping:** Students with similar learning levels were grouped together, and their IDs were created on the same tablets.

- **ID activation:** All students' IDs were created with the support of the MB team and ICT-in-charge (Teacher accountable for the Computer/Tablab in schools).

- **Incorporation in timetable:** Weekly ICT Lab lectures were incorporated in the school timetable for each grade in the school.

- **Alignment with Syllabus:** The content in the application (running on the tablets) was aligned with the school's syllabus coverage timeline.

- **Training for teachers:** A "Train the trainer" model was adopted to engage with the teachers and build ownership for traning. MB team used modules, infographics, and presentations to train the Principal and ICT – in charge. They further trained all the subject teachers to use the overall application.

- **Consistent operational and technical support provided:** Gandhi Fellows and Karuna Fellows were each allocated 2-3 schools, and they visited each school on a weekly basis.

- **Virtual Field Support:** A virtual field support center by Karuna Fellows engaged with parents, coordinated the grievances from the ground, and CG tech team resolved technical issues on-ground.

Chatbot for Revision (At Home)

WhatsApp chatbot was used as a medium to reach students with limited engagement in schools for assistance in revision. Chatbot enables easy access to learning content at home with just the student's ID. The Rajasthan government had started a digital program in 2020, Social Media Interface For Learing (SMILE), using WhatsApp chatbot as a medium for learning during Covid. Active students who had used SMILE chatbot more than 3 times a week were selected for the pilot with MB chatbot. During the pilot, they were sent weekly quizzes on two subjects for revision.

The chatbot had two key operative processes:

- **Registration:** Through awareness by the MB team and on-ground interaction, the selected students and schools were reached out for registration leading to 5000+ registration

- **Weekly Reports** Teachers used weekly reports on the chatbot dashboard to gauge the learning of the classroom

Personalised Adaptive Learning Content

Personalised Adaptive learning technology provides customised content based on a student's ability, which is assessed through test scores.

The school learning through PAL software took place in groups in the tab labs. The grouping of students is based on similar abilities and learning levels. The teacher will assess this learning level during the baseline of the scale-up. A separate SOP is provided to the teacher on student group creation to ensure the group's similar size and learning level.

Under the pilot, 4,000 tablets were provided to 62 schools selected based on the above criterion, with an equal split between secondary and senior secondary classes.

The tablets were pre-installed with MB PAL application with content from grades 8th to 12th covering the following subjects:

- 8th to 10th – English, Maths, Hindi and Science
- 11th to 12th – Physics, Chemistry, Geography, Political Science, Business Studies and Accountancy.

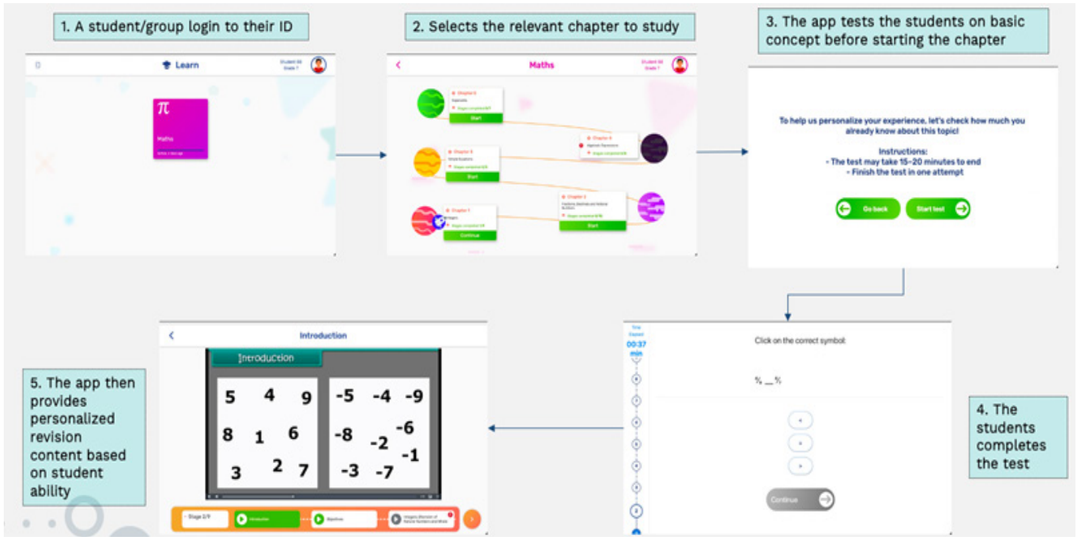

Figure 4: A student's journey on PAL technology

Enabling Stakeholders through Training

"Train the trainer" model was used for conducting training at school level. 124 Master facilitators in 62 schools were created for ICT, Gender and well-being. The master facilitator trained other school teachers.

The training was conducted on two themes:

1. Digital Education - Comprehensive modules on ICT, blended learning model, and PAL technology were made available in an engaging manner.

2. Gender and Social Emtional & Ethical learning (SEEL) - Modules on gender roles, stereotypes, and ways to mitigate them as a teacher in the classroom were made available.

External and Internal Monitoring

The project used a top-to-bottom approach for the program's governance and operational management. The governance mechanisms were in two ways:

1. External

- Monthly Governance meeting
- School-wise monthly update by teachers
- School Visits

2. Internal

- Tracking relevant KPIs
- Setting up on-ground processes
- Defining weekly nudges for schools

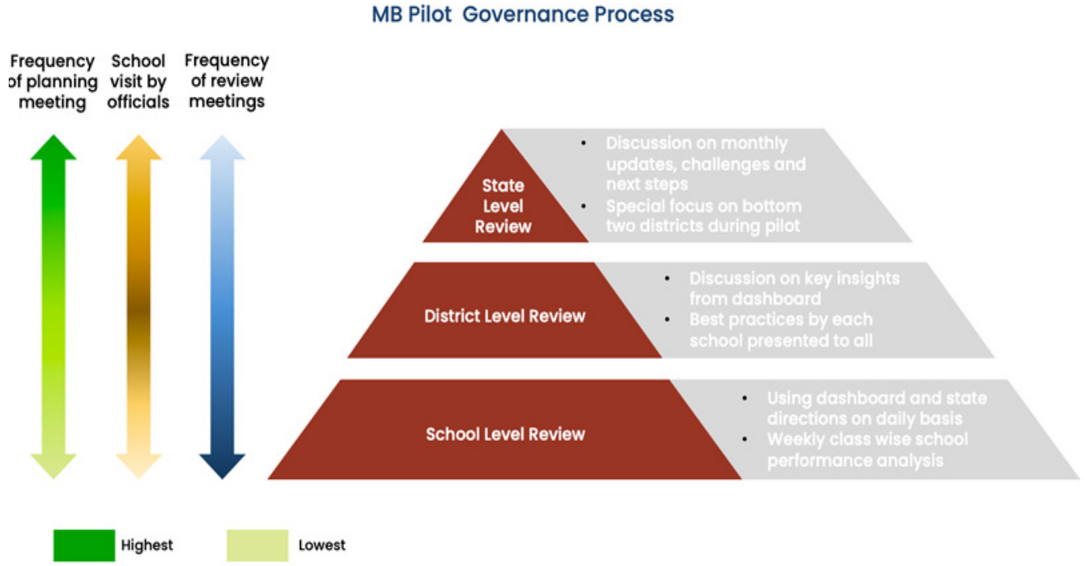

Figure 5: MB Pilot Governance Mechanism

Data-backed decision-making via Dashboard

Dashboard provided real-time results and analysis of the data recorded from the MB PAL App. The tech team created a multi-view dashboard for Tab-lab data analysis due to the massive chunks of data.

The dashboard recorded the information in three ways:

1. Static Information - List of schools districts, number of students connected, number of active tablets

2. Usage metrics - It analysed and calculated the pre-defined metrics such as Total usage, average usage per grade per subject, and syllabus completion

3. Learning metrics - Based on the scores of the pre-test (Quiz before main content) and post-test (Quiz after main content), the dashboard used to measure average score and improvement % used during pilot During the pilot, consistent monitoring of above KPIs was done to implement customised nudges in different geographical areas.

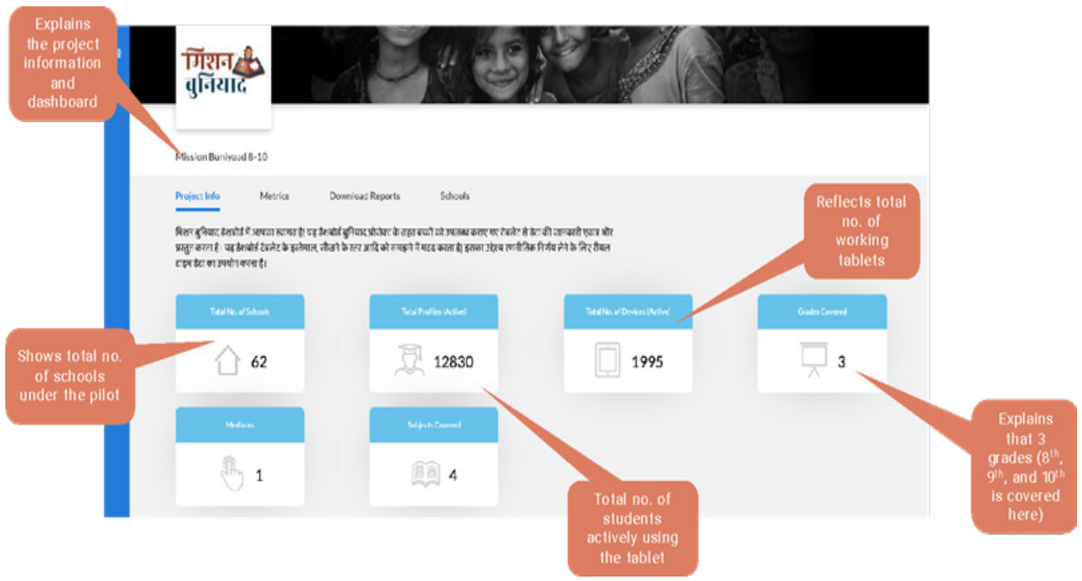

Figure 6: Real-time data analysis used during pilot

Community engagement

To enable access points in the community for students lacking access to schools at home, schools distributed the tablets in the community via a digital library model for more exposure and time to study.

Key features of the digital library model are

1. Building physical presence in the community

- Gandhi fellows organised classes when schools were closed in December 2021, wherein fellows consistently interacted with parents and students

- Fellows assisted the department in developing community engagement plans for all 33 districts

- Fellows organised nukkad natak (street play) on gender education and the importance of digital education among girls to sensitise the community

2. Using virtual nudges to maintain connect in the community

- Karuna Fellows supported tablet deployment by making regular calls and assisting teachers.

- Karuna Fellows also assisted parents by maintaining a communication channel between them and teachers.
- Fellows used nudges and developed the inclination of parents towards digital education.

IV. Pilot Results

Mission Buniyaad Project measured impact across three aspects: Access, Equity, and Quality.

Access: 4000 tablets were deployed in 62 schools reaching 21,287 girls

Equity: 120+ Master Facilitators created and trained on Gender and Social Equity in classrooms

Quality: 21 % increase in learning outcomes of students under tablet intervention and 11 % increase in learning via chatbot

Understanding MB's impact evaluation metrics is critical to ensure metrics are linked and determine how we can work together to build evidence across the entire continuum of learning - from in-school to at home. Impact metrics were measured in two ways 1. Externally and 2. Internally. Education Initiatives (EI) and Sattva Consulting conducted the Third-party evaluation (External evaluation) of Mission Buniyaad Program

1. External Evaluation and monitoring of impact metrics

An impact evaluation was conducted for the MB project on two aspects: (i). Achievement of learning outcomes (conducted by EI), and (ii) Program Management evaluation (by Sattva Consulting). The methodology of the evaluation is explained below:

- The evaluation team used random sampling to conduct baseline and endline assessments of the students

- The assessment tools consisted of Multiple-Choice Questions (MCQs) with four options

  The difficulty level of the tools was 40-60% (based on past performance data including baseline data)

- The questions used in the assessments required the application of different cognitive abilities - Mechanical, Understanding and Application (M-U-A) based.

- 7408 students across Classes 8 to 12 were selected out of 23,000 students under tablet intervention.

- 3702 students across Classes 8 to 12 were selected out of 5000 students under chatbot intervention.

a. Learning Evaluation by EI

EI team conducted the baseline assessment of the students in the following manner:

- Control Group: Students who were not part of the intervention.

- Tablet Group: Students who were a part of the intervention. Before the pilot began, a baseline assessment was conducted by the team to gauge the gain in learning levels based on the assessment.

- EI team used difference-in-difference regression analysis to calculate the absolute and relative gain in assessment for each grade and subject.

- Based on the report by EI, grade-wise learning distribution and increase in learning levels were taken as key learning impact metrics.

The evaluation showed that at least 19% students in the Tablet cohort had exhibited a jump of at least one learning level between baseline and midline, compared to 16% of students in WhatsApp group and 10% in the Control group.

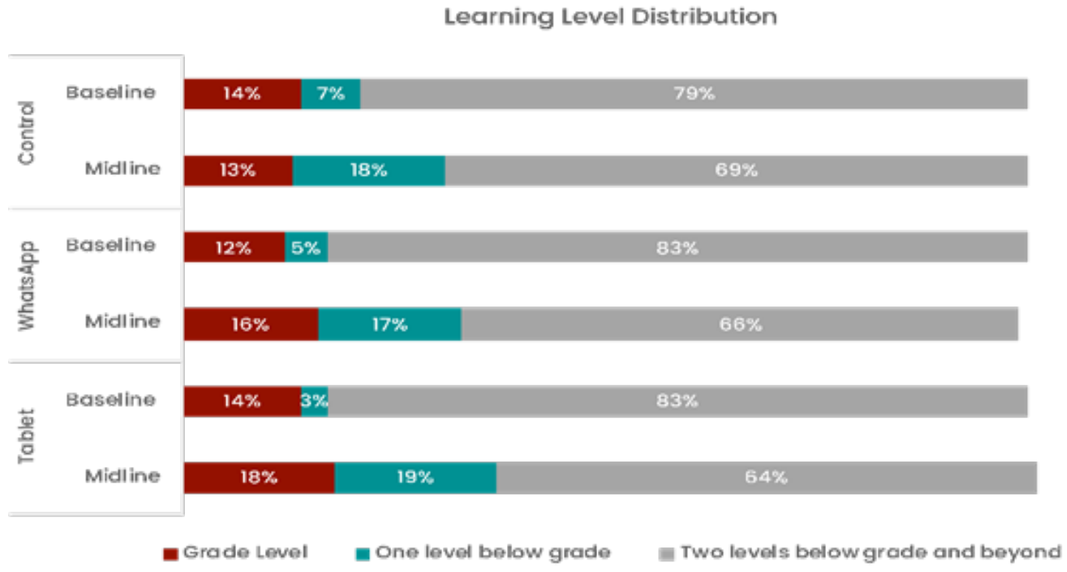

Figure 7: Third-Party Evaluation Control group vs Non-Control

b. Program Evaluation conducted by Sattva

A similar baseline and midline were conducted by the sattva team to gauge the preparedness, management and effectiveness of the Mission Buniyaad program.

- Sattva team evaluated the effectiveness of Mission Buniyaad through various metrics. Some of them were: (i) acceptance and usefulness of tablets, Improved capacity of children in using technology/devices, and (iii) engagement with government officials.

2. Internal Monitoring

MB pilot began with developing a streamlined data collection mechanism for the adaptive learning software. A dashboard was developed for efficient review and monitoring. The dashboard provided views at the state, district and school level.

Some of the key features of the metrics were:

- The dashboard showed active devices, IDs, usage metrics and learning metrics

- Thereby, weekly, these metrics were tracked for implementation

- Usage metrics such as data at students and device level: Average device usage, maximum usage, subject level usage per grade

- Learning metrics: Average pre-test scores, post-test-scores, syllabus completion

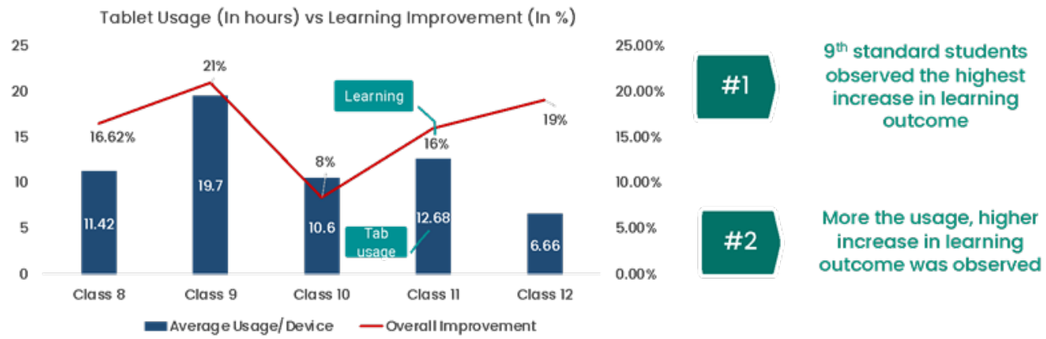

Figure 7: Third-Party Evaluation Control group vs Non-Control

Based on the external and internal results, a correlation analysis was conducted. The analysis showed a high correlation (0.73) between the usage time (in hours) and increase in learning outcome, for a particular grade.

- ***A trend between the number of hours spent by a child and the learning outcome was observed :*** the higher number of learning hours, the more increase in learning outcomes

- ***Explaining the result for class 12:*** For class 12, a significant improvement in learning outcomes was observed, with a much lesser usage time (as compared to other grades). This can be attributed to the multiple interventions are made by the state and external organisation which adds to learning outcome

V. Way Forward

The Mission Buniyaad program has provided substantial evidence for the potential of technology in education, and how it can be used as an enabling tool to increase learning outcome and reduce drop-out rates,

While the project's next stage was defined as a scale-up in 33 districts, impressive pilot results have significantly increased state ownership of the project. The scale-up will now be run fully under the guidance of the Rajasthan Education Department.

- Today, the state has more than 82,000 desktop screens in more than 6,500 schools. Note that the labs are not operational due to hardware issues, unstable internet, and lack of monitorig. This unused infrastructure will be used as a lever for scaling up Mission Buniyaad.

- Efficient activation of the labs will allow access to more than 2 Mn students enrolled in such schools out of which 1+ Mn are girls

- The Personalised Adaptive Learning software has been tailor-made for the ICT Lab hardware and tablets, based on the scale-up diagnostic study conducted by CG team.

CHIEF SECRETARY REVIEW MEETS

Ramp up 'digital learning' in all 33 districts: CS

Dr Rituraj Sharma

Notably, Under the Mission Buniyad programme of the State Government, girls from Class VIII to Class XII are given tablets for studying

Jaipur: Chief Secretary Usha Sharma on Monday directed to start the 'Mission Buniyad' programme in all districts of the State. The programme, aimed to promote digital education in Rajasthan, is presently being run in six districts.

In a review meeting of the programmes run by Children Investment Fund Foundation (CIEF), Chief Secretary Usha Sharma gave directions to promote digital education in all 33 districts through this programme.

During the meeting, officials of various other departments were also present. CS Usha Sharma discussed proposals related to expansion of activities, achievements and programs of the Foundation.

"Mission Buniyad, which is based on digital education, will now be extended to all districts of Rajasthan. Directions have been given to the officials of the foundation to prepare a proposal regarding the same," said Chief Secretary Usha Sharma.

Usha Sharma during a review meeting with officials.

IRON INJECTION TRIAL IN SMS

The Foundation officials also informed that trials of iron injections are underway in SMS Medical College. The iron injections will replace iron tablets to increase haemoglobin in pregnant women. The haemoglobin level of pregnant women can be increased upto 30 per cent through iron injections. Principal of SMS Medical College Dr Sudhir Bhandari said that giving iron through injection would make Rajasthan anemia free.

Learning during MB intervention

Local autonomy instead of one-size fits all approach:

It is easier to control student-to-device ratio in a small cohort than at a large scale, thereby it is essential to provide reasonable autonomy to school officials for running a tab-lab.

Innovative ways to ensure maximum device usage:

In a sharing model, individual device access to the student is limited at a school level. Therefore, a digital library model is useful, if monitored effectively, to mitigate issues related to device access.

Ensuring Governments' ownership:

Monitoring of the results by government stakeholders is crucial. This indicates the importance of the intervention, thereby developing a sense of ownership on the ground.

Strengthening the stakeholders on the ground:

It is crucial to invest in capacity building of stakeholders (such as principals, teachers, Fellows, and ICT in-charges), through training and regular nudges.

Tweaking the program to suit local cultural sensitivities and ensure community participation:

As an example, parents/guardians felt much confident once they were made aware that the tablets can only run educational content and not any other content (sucha s social media) which is seen as a digression and unwanted Influence by the elder members of the community

Creating a sense of empowerment:

Some of our girl students who were part of the pilot had never operated a digital device since they had none even in their family. So, once they started participating in the pilot, a sense of empowerment was felt and the confidence to operate any digital device has enhanced.

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