Dumka District Administration
Government of Jharkhand

Filo EdTech Pvt Ltd

Impact Assessment of **Tech-Driven Learning Acceleration Programme** in Rural Region of India

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Author Details

Dumka District, India

Dumka District Administration introduced tech-driven learning acceleration program in the district to help students overcome learning challenges.

Filo EdTech Pvt Ltd

EdTech organisation which provides on-demand one-to-one live high dosage tutoring services anytime anywhere to students. The organization has a global presence with more than 35 lakhs students across 15 countries.

About Author

The study design methodology and report formulation was led by **Ms. Richa Choudhary**, who is an Impact Evaluation Expert. Richa has vast experience in conducting policy research, project designing, providing technical and implementation support, and impact evaluation of education projects. She has worked for the World Bank, South Asia Region on education technology projects in the recent past. Earlier she was working with NITI Aayog, Government of India as a tertiary and school education Monitoring & Evaluation Expert.

Acknowledgement

The study is a result of independent evaluation of the outcomes of a tech-driven learning acceleration project to government school students, spearheaded by **Shri Ravi Shankar**, IAS, Deputy Commissioner, Dumka District Administration.

The technical and project implementation support was provided by Filo EdTech Pvt Ltd, led by **Mr. Imbesat Ahmad**,CEO & Founder at Filo, **Mr.Rohit Kumar** Co-founder & COO at Filo and **Mr.Shadman Anwer**, Co-founder and CTO at Filo. Filo Teachers worked tirelessly to provide 24x7 on-demand learning support to students, even at 4 am on a Sunday morning.

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Foreword

Every student has different learning needs owing to their diverse educational and socio-economic backgrounds. In an effort to provide inclusive education that meets the learning requirements of each individual student and provide a level playing field for all students, Dumka district implemented an innovative tech-driven Learning Acceleration intervention in collaboration with Filo Instant.

The AI technology driven Learning Acceleration Program identifies learning gaps that have accumulated over the years and provides 24x7 instant-teaching at the right time to accelerate the learning growth of students in the district. The intervention has brought about significant improvement in learning outcomes of students, especially from disadvantaged backgrounds in the district by providing them equitable access to quality education.

Student performance was continuously monitored through monthly learning assessments as well as based on the student's interaction with the platform.
This report highlights the findings from the impact assessment of the project on learning outcomes of students. The report also serves as an excellent case in point of how learning acceleration can speed up the process of bridging learning gaps and ensure all students are provided equal learning opportunities.

I am certain that the findings from this report will serve as invaluable lessons which we as a country need to adopt on a larger scale to bridge learning losses and reorient our education system from curriculum centred teaching to student centred learning.

Sri Ravi Shankar Shukla, I.A.S
Deputy Commissioner, Dumka
Government of Jharkhand

1. Abstract

The purpose of this study is to analyse the impact of the emerging concept of 'learning acceleration' in addressing student's learning gaps and enhancing their learning levels, especially for high-risk students from who struggle to pass state board examinations. The study focuses on understanding the impact of the tech-driven Learning Acceleration programme adopted by a remote and rural district - Dumka in Jharkhand State of India.

This study examines the learning outcomes of randomly selected sample students from control and treatment groups. The control group included students who had no exposure to the project, while the treatment group included students who were exposed to the tech driven learning acceleration program in Dumka District. The performance of students was evaluated in the Maths subject for Grade 11 and Grade 12 students through the baseline and endline learning assessments deployed during the academic session 2022-23 and also, based on student's interaction with the platform. The impact of the program for students from different socio-economic backgrounds has also been assessed to analyse how useful has been the program to build equity for students from disadvantaged backgrounds.

An overall improvement in Academic Performance by 14% in Mathematics was observed for treatment group students. Students from different socio-economic backgrounds - rural regions, low-income families (< INR 10,000 per month, ST/ SC Category, Female Students and first generation learners have shown remarkable improvement in their performance. Treatment group students were able to overcome non-linear learning gaps by bridging their foundational learning gaps while also enhancing their overall understanding of the topic. Also, reduction of high-risk students who struggled to obtain passing scores and has seen a transformational rise in the number of high-performing students. The evidence from the study can help education policy makers to devote attention to learning acceleration as an effective tool to bridge learning gaps aggregated over years among students, especially after COVID-19.

Keywords: Learning Acceleration, Education Technology, Non-Linear Learning Gaps, Learning Remediation, Learning Enhancement, School Education, India, Aspirational Districts, Dumka1.2 Background

About the Project

1.1 Background

The pandemic induced school closures led to decline in the learning outcomes of students due to limited student-teacher interactions and lack of access to digital technology (Vegas et al., 2021). The reopening of schools after nearly 82 weeks of remote learning led to students across the country struggling to catch-up and experiencing significant learning gaps (Hamid & Poorvaja, 2022). The National Achievement Survey 2021 (NAS) found that learning outcomes for students in classes 3, 5, 8 and 10 had dropped as compared to 2017 on subjects of mathematics, language and science. The country has seen an aggregation of non-linear learning gaps over the years, exacerbated by the COVID-19 Pandemic.

In India, various learning remediation programs have been introduced at the state and national level as an approach for learning recovery to overcome non-linear learning gaps aggregated over the years, especially during COVID-19. The central government's strategy, as evidenced by various policies including Project SATH-E and post-COVID guidelines to SCERTs, have been centred around introducing learning enhancement programmes (LEP). These LEPs largely focus on remediation to re-teach missed concepts, provision of remedial teaching manuals to teachers and educational resources to students such as remedial worksheets/workbooks (NITI Aayog, 2021 & Department of Education, 2022).

However, research shows that remedial programs are ineffective to cater to varied learning levels and can actually exacerbate learning loss. (NITI Aayog, n.d & Bauld, 2021). For instance, while several state governments such as Tamil Nadu, Uttar Pradesh, Gujarat, Madhya Pradesh and Jharkhand introduced after school remedial classes to bridge learning gaps, these classes are taken for batches of students grouped together, without proper understanding of learning levels of each student (Salve, 2022). Thus, remediation can become a vicious cycle: as gaps accumulate year after year, students miss more and more grade-appropriate content in favour of review of content from previous grades and become increasingly less likely to ever make it back to grade level mastery.

1.4 Learning Acceleration and 24x7 Instant-Teaching

An emerging practice to effectively and equitably close learning gaps is learning acceleration. Learning acceleration is the process of getting students ready for their new grade-level learning without holding them back for their pre-existing learning gaps. It emphasizes building on students' existing knowledge, and using a range of evidence-based instructional strategies to promote student learning.

For example, instead of spending weeks covering an entire missed unit in math, teachers can look ahead at the grade-level standards to determine what are the most important skills students need to have and can design scaffolds — specific supports — to help students with understanding key literary concepts and filling in missed background knowledge. The teacher can continue teaching the current grade unit while ensuring students have everything they need to succeed in that unit, on-demand, as many times as they might need.

Learning acceleration can be achieved through "just-in-time" interventions — the right type or amount of support at the right time - to fill in gaps in learning (Andrew, B 2021; Bauld 2021; Dorn et.al 2020; TNTP 2021). This approach involves providing students with one-on-one tutoring sessions that are instant, intensive, and frequent. These one-on-one tutoring sessions are referred to as high-dosage tutoring and provision of just-in-time learning to students is referred to as instant-teaching.

Research has shown that learning acceleration can have a significant impact on student learning, particularly for students who have fallen behind. This approach can also be personalized to meet the needs of individual students, making it an effective tool for addressing the diverse needs of learners.

Analyzing data from more than two million students from various non-profit organisations found that students in remediated classes struggled 10 times more than students in classes that chose acceleration (Andrew, B. 2021).

Students in accelerated classrooms thrived, completing 27% more grade-level lessons than their remediated peers, and mostly regained their pre-pandemic success on grade-level math (TNTP Reimagine Teaching, 2021). Meanwhile, remediated students not only continue to struggle, but fall even further behind in their learning, getting caught in a cycle of missing more and more grade-appropriate content. Learning acceleration was particularly effective for students from low-income families (TNTP Reimagine Teaching, 2021).

Learning acceleration is an effective strategy which not only helps students catch up and continue grade-level instruction in less time, but also facilitates the integration of marginalized children into learning, especially girls, and children from poor and rural areas.

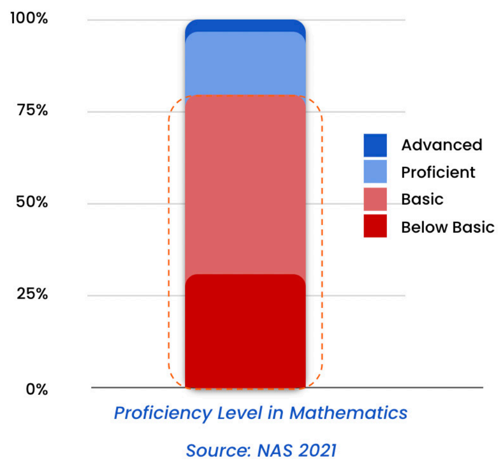
About Dumka District

Dumka is a remote aspirational district in the state of Jharkhand in India. The district has been declared as one of the country's 110 Aspirational Districts (most backward district out of a total of 640 districts) by the Government of India. Dumka is primarily a rural district with over 93% of the population inhabiting rural areas while only 7% of the population lives in urban Dumka.

Dumka has a total of 2598 schools across different management categories with Govt. run schools forming the majority at 90.97% (UDISE 2021-22). The district has a total of 8000+ teachers with subject-specific teacher strength reducing significantly for Secondary and Higher Secondary grades (UDISE 2021-22). The education indicators such as gross enrollment ratio of 46.64 at the secondary stage is much below the state average of 67.44 (UDISE 2021-22).

According to the Department of School Education and Literacy, primary enrolment in the academic year 2021-2022 stood at 51.50%, upper primary enrolment at 27.67%. The secondary and higher secondary school enrolment stands at 12.06% and 7.01% respectively. Gender-wise figures show near parity, with 49.49% of girls and 50.51% of boys being enrolled. Further, OBC enrolment stands at 47.97%, whereas SC and ST enrolment account for 42.95% and 6.45% respectively. The district also has high dropout rates, especially at the secondary school level.

According to the NAS 2021 report, Dumka district performed much lower than the national average in almost all subjects across classes 3,5,8 and 10. Majority Grade 8 and Grade 10 students have below basic and basic grade level competencies for all subjects including Maths, Science and Social Science (NAS, 2021). Further, only 54% of students have access to digital devices in the school, and only 21% of schools have adequate audio-visual resources.



Proficiency Level of Class 10th Students in Mathematics

Source: NAS 2021

About the Project

To address these challenges, Dumka district introduced an innovative learning intervention by providing tech-driven learning acceleration to students in an effort to bridge the learning gaps in schools and support learning recovery. The project provides unlimited instant access to live teachers who are available 24x7 to all the students.

Objective of the Project:

- Improving academic performance of students at grade level
- Building equity by improving performance of underserved and underprivileged students
- Helping students overcome non-linear learning gaps aggregated over the years
- Supporting high-risk students and at the same time creating impact beyond high-intent and high performing students in the class
- Providing personalised support to every student accounting for their unique learning needs

The key features of the project include:

- Provide personalized learning focusing on “just-in-time” interventions — the right type or amount of support at the right time
- Introduce student-centered learning approaches to further improve existing learning outcomes rather than curriculum-centred teaching focussing on completing the grade level curriculum.
- Provide one-on-one student-teacher interactions through online live tutoring sessions
- Provide virtual 24x7 learning support to help students get a strong grasp on foundational concepts
- Enables customization of live sessions in regional language making it more accessible to students

The program was introduced to students from 26 government schools in the district with Science Stream in Grade 11 and 12. Students got access to 24x7 instant-teaching for subjects including Mathematics, Biology, Physics and Chemistry. The aim of the project was to improve learning outcomes by closing learning gaps and provide quality education to underprivileged students. This study analyses the outcomes of the tech-driven learning acceleration intervention implemented in Dumka district

Under this project, learning-acceleration is implemented by providing 24x7 instant access to live teachers to every student covered under the project. This is performed using a matching algorithm to connect the student with the right teacher in less than 60 seconds, based on immediate requirement of the student, student’s educational profile, student’s local-social context, past preferences, teacher’s expertise in different academic & pedagogical fields and their own local-social context

Methodology

2. Research Methodology

The objective of the research is to better understand the impact of the tech-driven learning acceleration project on improving learning outcomes of students from a rural district of India.

Impact Evaluation Framework

The impact evaluation framework for the project includes analysis of academic performance of students over the project duration. It is built based on the six major objectives of the project and each objective is measured by an indicator to gauge the level of impact the project has created.

The table below describes the framework used for evaluating the impact of the project.

S.No.	Objective	Indicator	Description
1	Improving overall Academic Performance	Average scores in the subject	Analyse average scores of students in a subject from Baseline to Endline to assess overall improvement.
2	Improvement for students with different academic performance	Percentile scores comparison	Comparing performance of a class across different percentiles to understand distribution of data.
3	Building equity in learning by impacting underprivileged students	Socio-Economic background analysis	Assess performance of students across multiple socio-economic categories: (i) Gender (ii) Caste (iii) Location (iv) Family income (v) Parent's educational background
4	Helping students overcome non-linear learning gaps	Level-of-understanding based growth	Study growth in level-of-understanding of the student across different levels: • Lacks Foundation • Concept Familiarity • Application Proficiency
5	Reduction of high-risk students and growth of high-performing population	Identify high-risk students and track their performance	• Identification of high-risk students based on their academic performance in baseline. • Track the academic performance of all students over the project duration
6	Providing personalised learning support to every student	Case study for a student's individual growth	• Identification of learning gaps • Learning engagement on the platform • Improvement in academic performance with engagement • Improvement in conceptual understanding of the Subject • Aspirational growth of the student

Table 1: Impact Assessment Framework

2.2 Methodology

The study is a quasi experimental research where students are sampled from the beneficiary population (Treatment cohort) and a comparison group (Control cohort) that comprises students from similar socio-economic backgrounds and learning abilities was also created to isolate the impact of Filo usage on a student

The study has been conducted through mixed methods research, employing both quantitative and qualitative research techniques. To collect data on the impact of learning acceleration on students, learning assessment tools were deployed over the project duration. For understanding the impact of 24x7 instant-teaching, the study has been executed using a longitudinal design where multiple strands of the evaluation were undertaken. To gain a more holistic picture, students were also interviewed using survey questionnaires.

2.3 Selection of Sample

Sampling

The study examines the performance of control and treatment group students with similar socio-economic and educational background.

Control Group includes students who had no exposure to accelerated learning project

Treatment Group includes students using 24x7 instant-teaching platform for Learning Acceleration project

Around 22% of the beneficiary students were randomly selected to be part of the Treatment Group in the impact evaluation study. The students were selected across four schools with 24x7 instant teaching intervention.

One school, situated in Dumka and consisting of students with similar socio-economic background, was selected as the base for the Control Group.

Grade	Beneficiary population	Sample Distribution	
	Filo Instant	Treatment cohort	Control cohort
Grade 11	508	125	54
Grade 12	387	68	38
Total	895	193	92

Table 2: Sample Distribution

Sample Population Characteristics

The distribution of the sample across different socio-economic parameters including Gender, Location, Caste, Family income and Parent's education for both control and treatment group is described below:

Gender

Less than 23% female students have taken Science Stream in Grade 11 and Grade 12

- Sample distribution is homogeneous for both Control and Treatment group in terms of gender
- 23% students from Control group and 22% students from Treatment group are female
- 77% students from Control Group and 78% students from Treatment Group are male

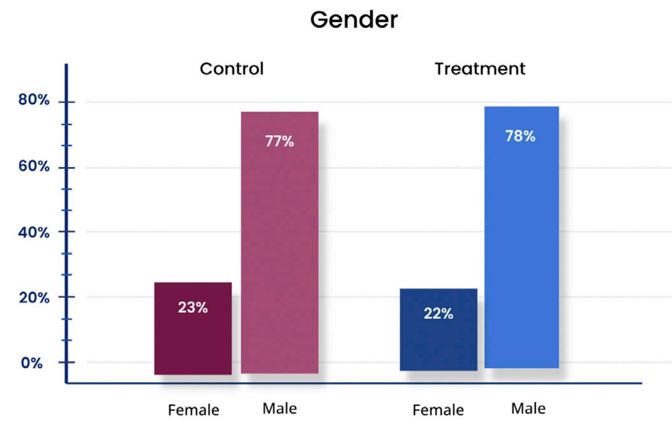


Figure 1: Sample Distribution based on Gender

Location

Majority of the sample population belongs to Rural Regions

- Sample distribution is similar for both Control and Treatment group in terms of location of students
- 56% students from Control group belong to rural areas of the district while same is 60% for Treatment group
- Around 30% students from both control and treatment group belongs to urban region

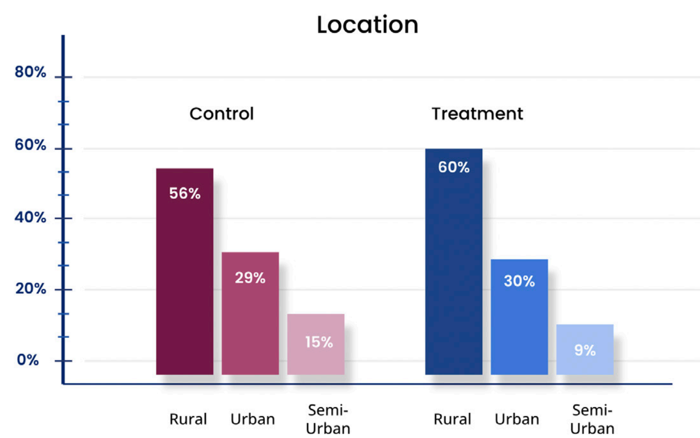


Figure 2: Sample Distribution based on Location

Caste

Majority of sample population belong to OBC, SC and ST Category

- More students in Treatment group (15%) belong to SC/ST category than Control group (8%)
- Nearly 70% students from Control and Treatment group belong to OBC
- Only 19% student from Control Group and 14% students from Treatment Group belongs to General Category

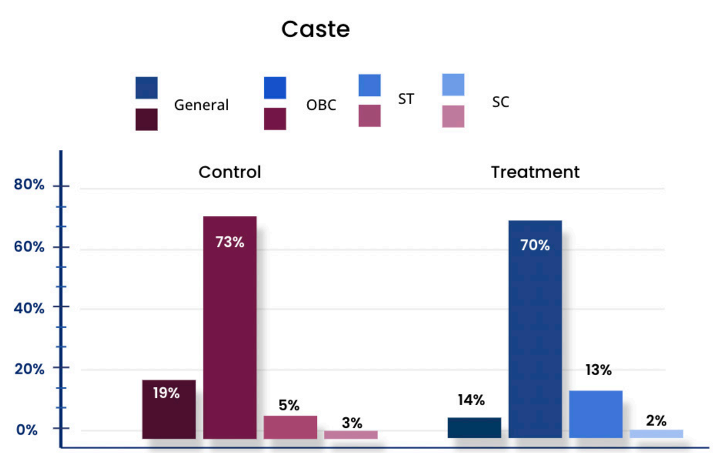


Figure 3: Sample Distribution based on Caste

Family Income

Majority of sample population belongs to less than INR 10,000 per month family income

- Sample distribution is similar for both Control and Treatment group in terms of their family income
- Around 64% students from both Control and Treatment group have less than INR 10,000 per month family income
- Around 29% students from both Control and Treatment group have family income between INR 10,000 - 30,000 per month
- Around 5% students have family income between INR 30,000 per month and INR 50,000 per month
- Only 1% sample students have family income greater than INR 50,000 per month

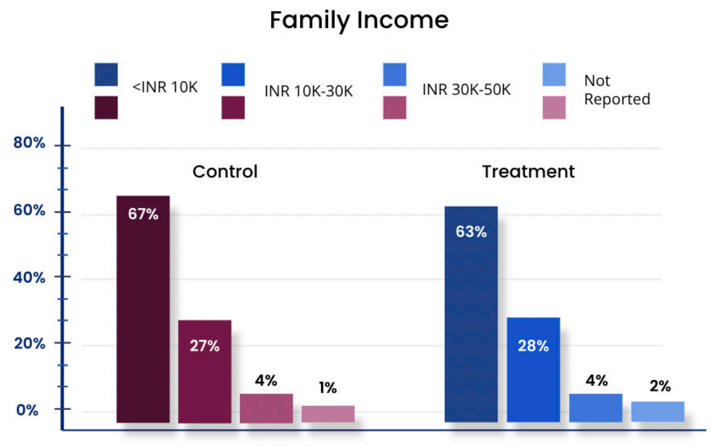


Figure 4: Sample Distribution based on Family Income

Parents' Education

The distribution of sample students based on their parent's education is given below:

Father's Education

Around 40% sample students have their father's education upto Grade 5 and Grade 10

- 11% students from Control and 14% students from Treatment have their father's education upto Grade 5
- 27% students from Control and 28% students from Treatment have their father's education upto Grade 10
- 29% students from Control and 24% students from Treatment have their father's education upto Grade 12
- Only around 18% students from both Control and Treatment have their father's education as Graduate

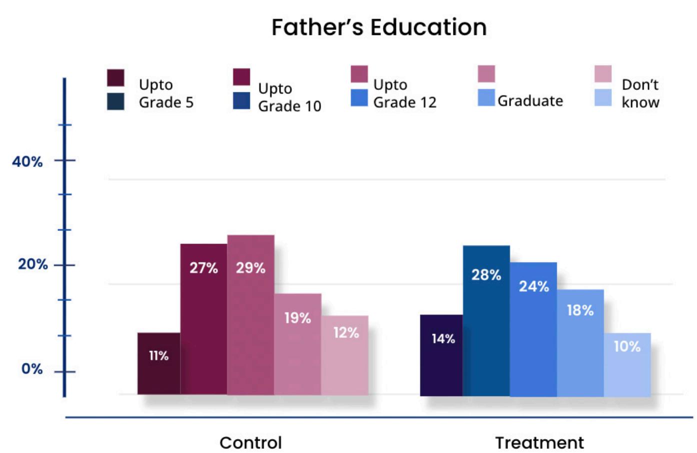


Figure 5: Sample Distribution based on Father's Education

Mother's education

Around 60% sample students have their mother's education upto Grade 5 and Grade 10

- 18% students from Control and 21% students from Treatment have their mother's education upto Grade 5
- 52% students from Control and 38% students from Treatment have their mother's education upto Grade 10
- 12% students from both Control and from Treatment have their mother's education upto Grade 12
- Only around 9% students from both Control and Treatment have their mother's education as Graduate

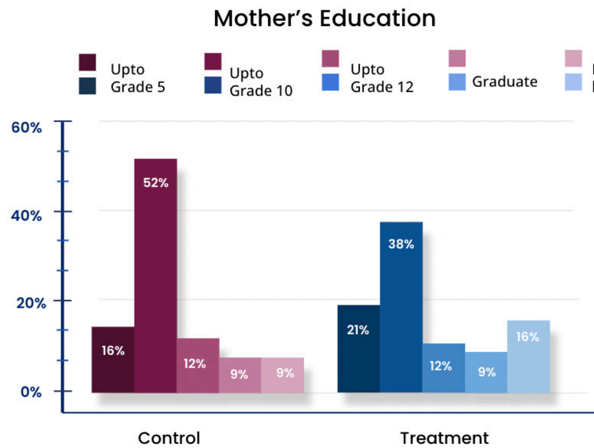


Figure 6: Sample Distribution based on Mother's Education

2.4 Data Analysis

Impact evaluation of learning outcomes for these students were undertaken through:

- **Learning Assessments:** Baseline and endline learning assessments were used as tools to analyse the performance of students over the project duration in the academic session 2022-23. Further, the student's level of understanding for the subject and topic is analysed to evaluate the non-linear learning gaps[1] across the cohort. It includes studying the growth in level-of-understanding of students. Where, the level of understanding of the student is defined using Bloom's taxonomy[2]
- **Survey Questionnaire:** Surveys were conducted to understand diverse socio-economic backgrounds and educational backgrounds of students. The performance of students is analysed across different socio-economic categories.
- **Assessment of Student's Performance based on their interaction with the Platform:** AI driven mechanism on the platform analyses the learning sessions taken by students to assess student's ability to understand the topic and accordingly bridge the identified learning gap in the session. The internal platform usage data is analysed to share the accelerated learning journey of a student through Case Study of a student.

[1] Non-linear learning gaps refer to the phenomenon where the pace of learning among students in a classroom or a group is not consistent or uniform, but instead, there are significant disparities in the speed at which different students acquire new skills and knowledge. These gaps can be called "non-linear" because they do not follow a straight, linear progression over time. There are many factors that can contribute to non-linear learning gaps, including differences in prior knowledge, learning styles, motivation, and even personal circumstances outside of school. Teachers and educators can help address these gaps by using differentiated instruction, which involves tailoring their teaching methods and materials to meet the diverse needs and abilities of their students. This might involve providing additional support or resources to struggling students, challenging more advanced students with more complex tasks, and providing opportunities for all students to work at their own pace and level.

[2] Bloom's Taxonomy: It is a framework used for deriving learning outcomes by assessing learning levels on a variety of cognitive levels.

Findings

3. Findings of the Impact Assessment

3.1 Improvement in Overall Academic Performance

Finding 1 : Usage of 24x7 instant-teaching significantly improved students' average scores.

- Grade 11 students using 24x7 instant-teaching showed an overall improvement by 15% in Mathematics whereas control group students saw a decline of 8%
- Grade 12 students using 24x7 instant-teaching showed an overall improvement by 8% in Mathematics whereas control group students saw a decline of 15%

Class 11 using 24x7 instant-teaching exhibited an overall improvement by 15% in Maths scores, with the average score improving from the 60% at baseline to 75% at endline. In comparison, the control group students saw a 8% decline (from 57% at baseline to 49 % at endline) in average scores.

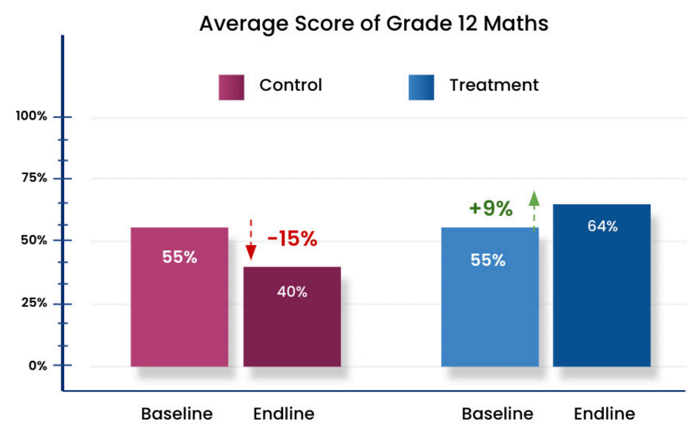


Figure 7: Average Marks of Grade 11 Students

Grade 12 students from treatment group exhibited an overall improvement of 9% in Maths scores, with the average score improving from the 52% at baseline to 64% at endline assessment. In comparison, scores of the control group students decreased by 15% (from 55% at baseline to 40% at endline)

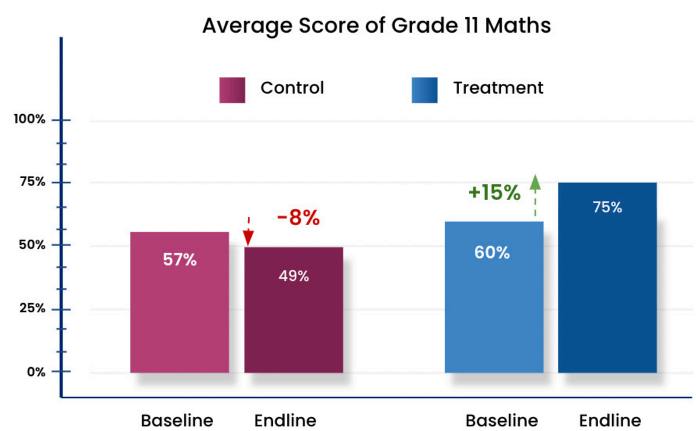


Figure 8: Average Marks of Grade 12 Students

3.2 Improvement for students with different academic performance

Finding 2: Students using 24x7 instant-teaching improved across 25th, 50th, 75th and 90th percentiles, indicating a class-wide growth in learning outcomes.

Grade 11 students from the treatment group using 24x7 instant teaching have shown a class-wide improvement in performance

- At 90th percentile, an improvement of 7% is observed in treatment group whereas control group nearly remained at the same level
- At 75th percentile, an improvement of 15% is observed in treatment group whereas a decline of 7% is observed for control group
- At 50th percentile, an improvement of 20% is observed in treatment group whereas a decline of 7% is observed for control group
- At 25th percentile, an improvement of 13% is observed in treatment group whereas a decline of 7% is observed for control group

High Performance Segment [75th:100th] Percentile: Improvement in the maths scores is observed for treatment group students for this segment whereas a decline in performance of control group students is observed in this segment.

Low Performance Segment [25th:50th] Percentile: Improvement in the maths scores is observed for treatment group students for this segment whereas a decline in performance of control group students is observed in this segment.

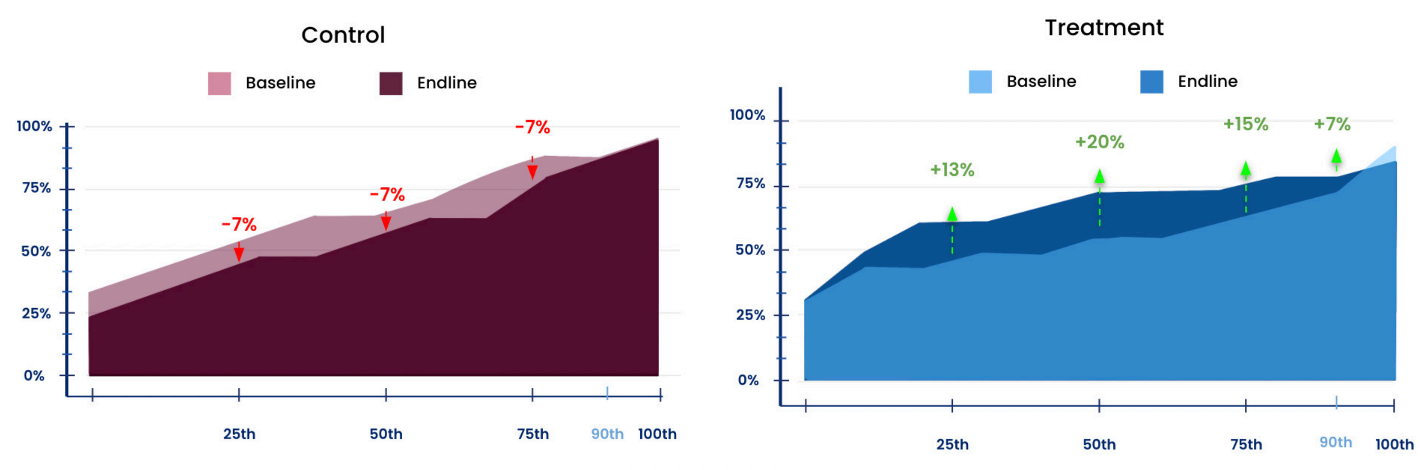


Figure 9: Percentile Scores of Grade 11 Students

Grade 12 students from the treatment group using 24x7 instant teaching have shown a class-wide improvement in performance.

- At 90th percentile, an improvement of 7% is observed in treatment group whereas a decline of 17% is observed for control group
- At 75th percentile, an improvement of 7% is observed in treatment group whereas a decline of 20% is observed for control group
- At 50th percentile, an improvement of 13% is observed in treatment group whereas a decline of 20% is observed for control group
- At 25th percentile, an improvement of 27% is observed in treatment group whereas a decline of 7% is observed for control group

High Performance Segment [75th:100th] Percentile: Improvement in the maths scores is observed for treatment group students for this segment whereas a massive decline in performance of control group students is observed in this segment.

Low Performance Segment [25th:50th] Percentile: Improvement in the maths scores is observed for treatment group students for this segment whereas a decline in performance of control group students is observed in this segment.

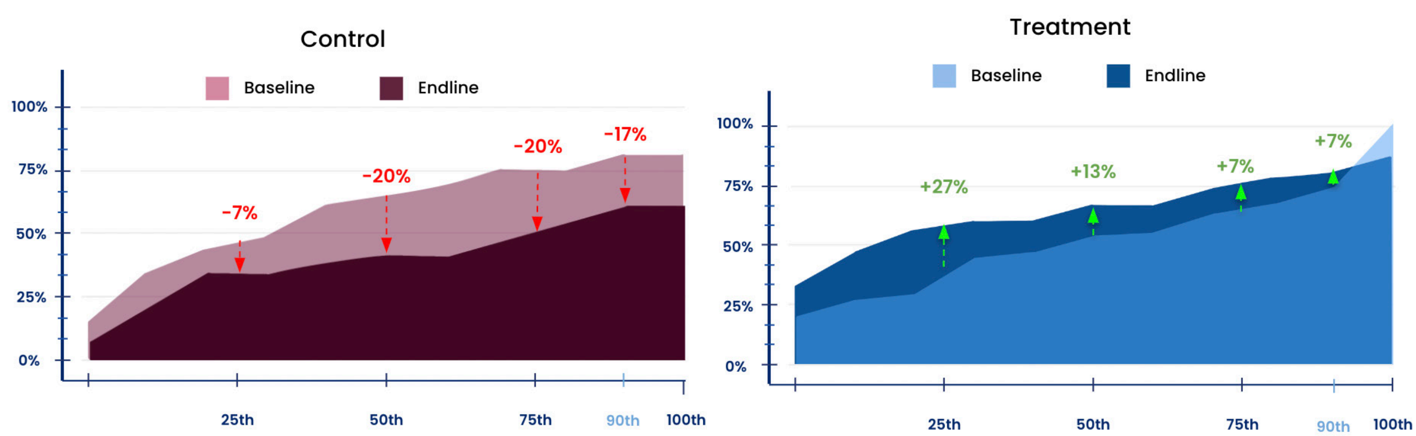


Figure 10: Percentile Scores of Grade 12 Students

3.3 Building equity in learning by impacting underprivileged students

3.3.1 Supporting equitable education for female students

Finding 3: Female students using 24x7 instant-teaching showed a remarkable improvement of 18% as compared to 12% improvement among their male counterparts

Among female students, treatment group students using Instant teaching exhibited an improvement of 18% in Maths Scores. Average scores of female students of the treatment group increased from 54% (at baseline) to 72% (at endline). In comparison, academic performance of female students of control group students remained nearly at the same level.

Among male students, treatment group students using Instant teaching showed 12% improvement in scores. Average scores increased from 58% to 71% from baseline to endline assessment.
The academic performance of male students of the control group declined by 13%.

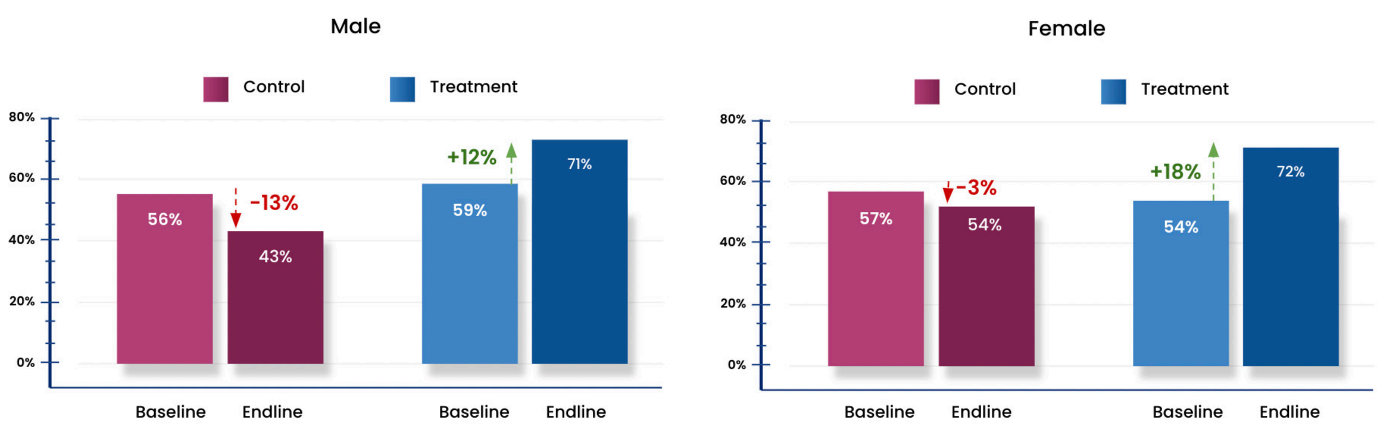


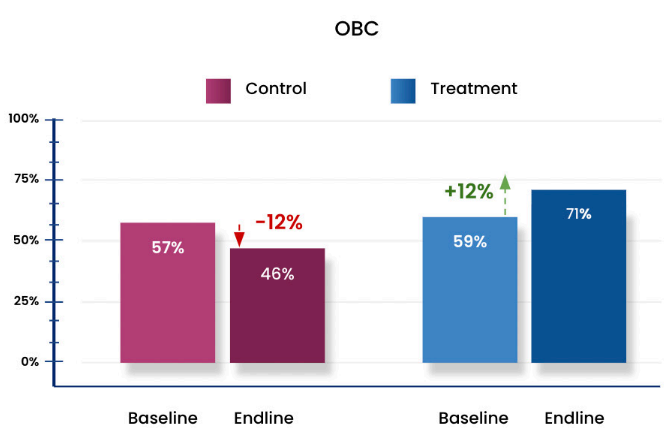
Figure 11: Performance of Male and Female Students

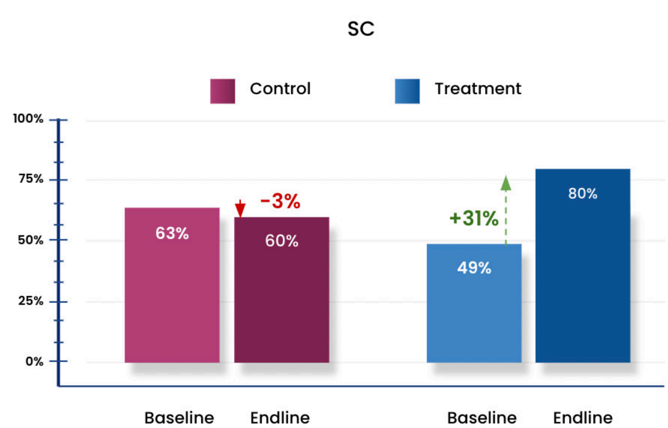
3.3.2 Providing equitable education to underserved students

Finding 4: Instant usage enabled students from underserved categories to significantly improve learning achievement. Treatment group students belonging to the OBC, SC and ST categories using 24x7 instant-teaching performed considerably better than their peers from the Control Group.

Usage of the instant teaching application enabled students from underserved caste categories such as OBC, SC and ST to improve their Maths scores.

- Among students belonging to the **Other Backward Castes (OBC) category**, the treatment group showed 12% improvement in scores, with average scores increasing from from 59% at the baseline to 71% at the endline . Whereas, control group students faced learning losses, with average scores declining by 12%, from 57% to 46%.
- Among students belonging to the **Scheduled Caste (SC) category**, Students using Instant teaching showed 31% improvement in scores, from 49% at the baseline to 80% at the endline. Control Group students showed a decline of around 3%, from 63% to 60%.
- Among students belonging to the **Scheduled Tribes (ST) category**, students using Instant teaching showed 24% improvement in scores, whereas Control Group students showed a decline of 25%. Treatment group students increased scores from 49% at baseline to 73% at endline. Comparatively, control students faced learning losses, with scores decreasing from 60% to 35%.
- Among students belonging to the **General category**, students using Instant teaching showed around 8% improvement in scores (62% at baseline to 70% at endline), whereas Control Group showed a decline of 7% (51% at baseline to 44% at endline).





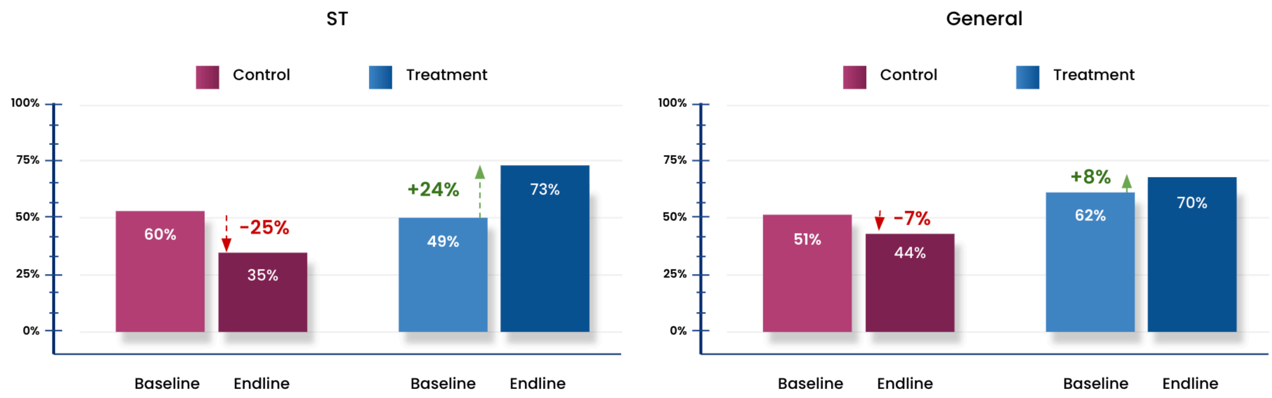


Figure 12: Performance of Students based on their Caste Categories

3.3.3 Supporting education of students from Rural regions

Finding 5: A massive decline of 15% in Rural students was arrested and converted to an improvement of 12%. While the Urban counterparts did not see a decline, they also improved by 16% using 24x7 instant-teaching.

It is observed that performance of students from both control and treatment groups is nearly the same at the baseline. Also, students from rural areas lag behind their urban peers. The intervention has supported students from all regions to recover learning gaps and further improve their learning levels.

- Students from rural areas of the district using Instant Teaching showed 12% improvement in scores, from 57% at baseline to 69% at endline. Whereas Control Group students showed decline by 15%, from 55% at baseline to 40% at endline.
- Students from semi urban areas using Instant-teaching showed 6% improvement in scores, whereas Control Group students showed decline by 7%.
- Treatment group students from urban areas showed 17% improvement in scores, whereas Control Group students showed decline by 2%.

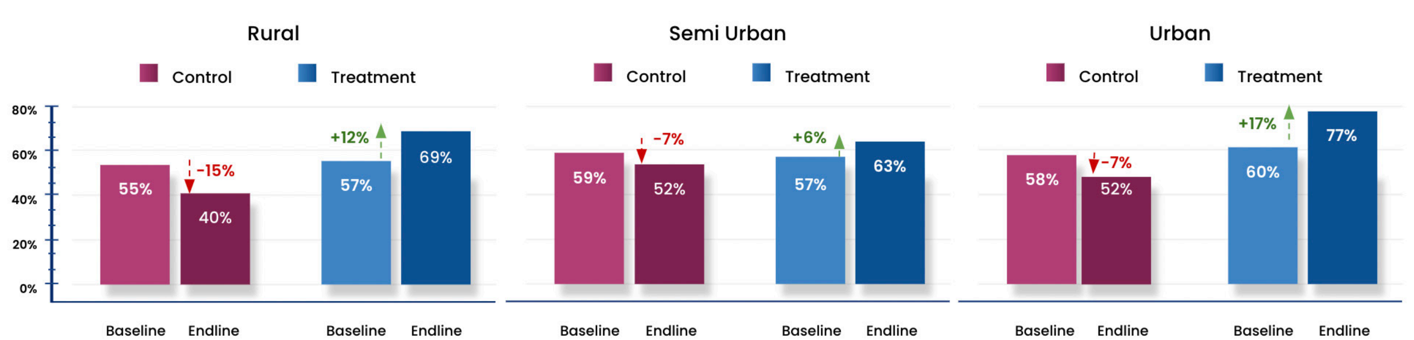


Figure 12: Performance of Students based on their Location

3.3.4 Facilitating equal learning opportunities for students from low-income families

Finding 6 : Students from families with income less than INR 10,000 per month using 24x7 instant-teaching showed an overall improvement of 14% whereas Control group saw a decline of 12% in academic performance

Family income has an effect on learning levels of students for varied reasons such as availability of learning resources, involvement of students in household and farm activities.

This can be seen **at the baseline where less than INR 10,000 family income students have lowest performance across all income groups.** Also, a decline in the performance of control group students is observed for income groups less than INR 30,000 and control group students remain almost at the similar learning levels for income groups greater than INR 30,000.

The adoption of instant-teaching applications has helped students equally from all income groups. Specially, the students from low-income families using Instant displayed significant improvement in Maths learning outcomes.

- Among students whose families earned less than INR 10,000 per month, students using Instant showed almost 14% improvement, with scores increasing from 56% to 70%. In comparison, control group students experienced learning losses as scores decreased by 12%.
- Among students with families income between INR 10,000-30,000 per month, students using Instant showed 11% improvement, with scores increasing from 61% to 72%. Again, Control group students experienced a degrowth of nearly 7%.
- Students with family income between INR 30,000-50,000 per month showed 9% improvement in the treatment group and 6% improvement in the control group. This shows that with an increase in family income students are able to focus more on their education through availability of better learning resources.
- A very few sample students had family income greater than INR 50,000 per month.

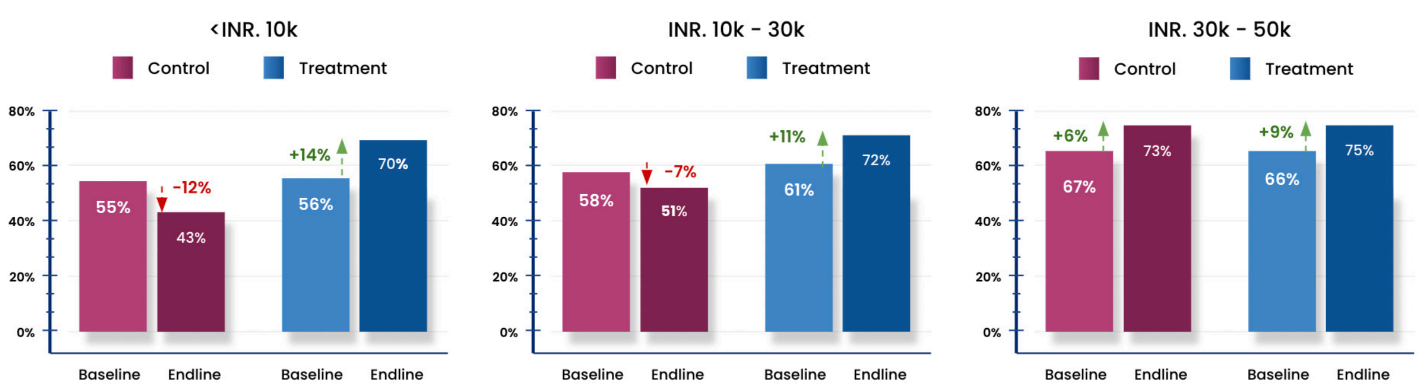


Figure 13: Performance of Students based on their family income

3.3.5 Assisting students who lack learning support from family

Finding 7: Instant usage assists students in overcoming barriers related to lack of learning support from family and has levelled the playing field for every student.

- Treatment group students using Instant, whose fathers' level of education was less than Grade 5, displayed a 20.42% improvement in Maths scores.
- Treatment group students using Instant,whose mothers' level of education was less than Grade 5 displayed a 20.34% improvement in Maths scores
- In the Control group, decline in performance is inversely proportional to the parent's qualification.

Parents' level of education is one of the strongest factors in determining a child's success at school as parent's education signifies availability of academic support at home. A study by the Office for National Statistics (ONS) study found that children are seven and a half times less likely to be successful at school if their father has low achievement levels. This study corroborates these results, as students whose parents had low levels of education and received no interventions (control group) faced severe degrowth and learning losses.

In comparison, the usage of Instant helped treatment group students whose parents had low levels of education in overcoming barriers related to lack of learning support from parents and score much higher.

Father's education and its impact on learning outcomes

The performance of students is lowest (only 46%) when father's are educated upto Grade 5 as compared to 55% in case fathers are educated up to 12th grade at the baseline. Similar trend is observed for control group students in endline assessment where students performance is lowest when father's education is Upto Grade 5. Thus, **the performance of students is directly proportional to their father's education level**, signifying father's play an important role in providing academic support at home.

The usage of instant teaching has provided level playing field for all students:

- Father's Education Upto Grade 5: Students using instant teaching showed a remarkable improvement of 21%)in Maths scores, as compared to the control group with decline in performance of around 11%.
- Father's Education Upto Grade 10: Treatment group students using Instan displayed a 10% improvement in Maths scores, while a 12% decline in scores was observed for control group students.
- Father's Education Upto Grade 12: The treatment group displayed a 13% improvement in Maths scores, as compared to the control group where scores declined by 5%.
- Father's Education Upto Graduation: A very few students have their fathers education upto graduation

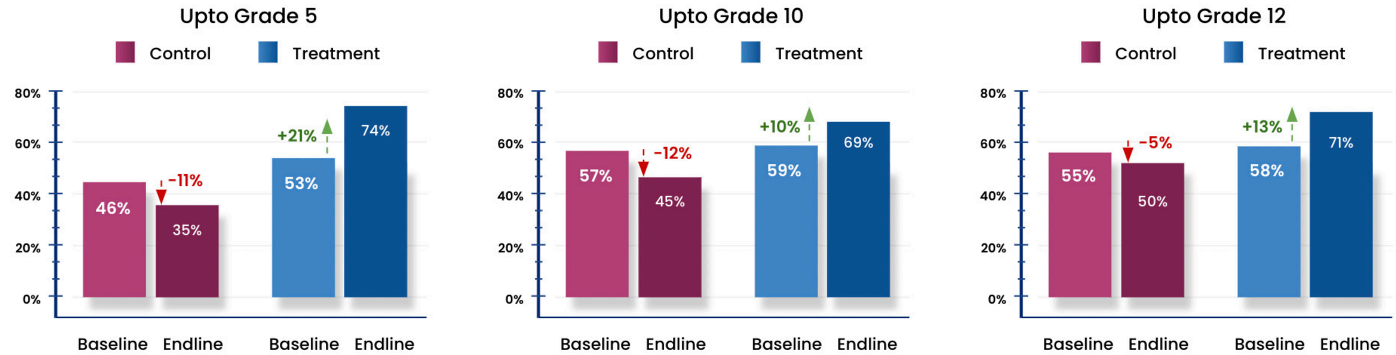


Figure 14: Performance of Students based on their father's education

Mother's education and its impact on learning outcomes

- The performance of students is lowest(only 53%) when mother's are educated upto Grade 5 as compared to 64% in case mothers are educated up to 12th grade at the baseline for Control group Students. Similar trend is observed for control group students in endline assessment where students performance is lowest when mother's education is Upto Grade 5. Thus, the performance of students is directly proportional to their mother's education level, signifying mother's play an important role in providing academic support at home.

The usage of instant teaching has provided level playing field for all students:

- Mother's Education Upto Grade 5: Students using instant teaching showed a remarkable improvement of 18% in Maths scores, as compared to the control group with decline in performance of around 14%.
- Mother's Education Upto Grade 10: Treatment group students using Instant displayed a 10% improvement in Maths scores, while a 8% decline in scores was observed for control group students.
- Mother's Education Upto Grade 12: The treatment group displayed a 6% improvement in Maths scores, as compared to the control group where scores declined by 16%.
- Mother's Education Upto Graduation: A very few students have their mother's education upto graduation

[3] https://wol.iza.org/news/fathers-education-strongest-factor-in-childs-school-attainment-

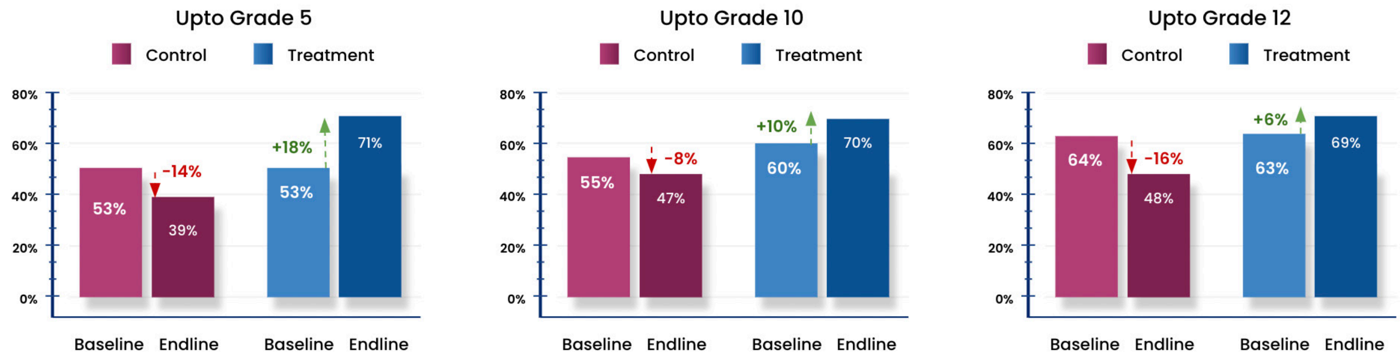


Figure 14: Performance of Students based on their mother's education

3.4 Overcoming non-linear learning gaps

Finding 8 : 24x7 instant-teaching significantly reduced Foundational learning gaps while also building Application proficiency among students. Level of Understanding remained the same in the Control group.

Grade 12

Students using Instant were able to improve foundational knowledge and proficiency in the application of mathematics concepts much more effectively than control groups students

- Around 26% Students using 24x7 instant-teaching recovered their foundational learning gaps in mathematics
- Application proficiency of students using instant-teaching improved to 16%
- In comparison, control group students exhibited a decline in foundational knowledge, a marginal improvement in concept familiarity and no student was observed to have application proficiency at the endline.

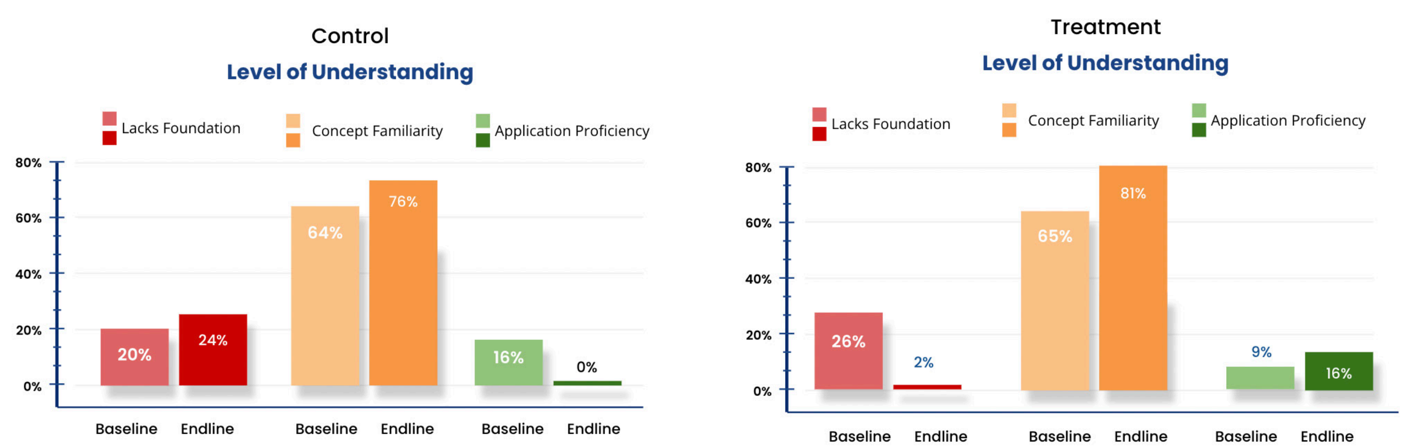


Figure 15: Grade 12 - Non-Linear Learning Gaps

Grade 11

Significant improvement in foundational knowledge and application proficiency of mathematics concepts were observed in the treatment group students using Instant for learning acceleration.

- Concepts Application Proficiency improved to 53% in treatment group students using 24x7 instant-teaching while in the control group only 16% of students were adept at application of concepts.
- At the endline, only 1% beneficiary students faced foundational learning gaps in treatment group, whereas 22% students in control group faced foundational learning gaps in Mathematics

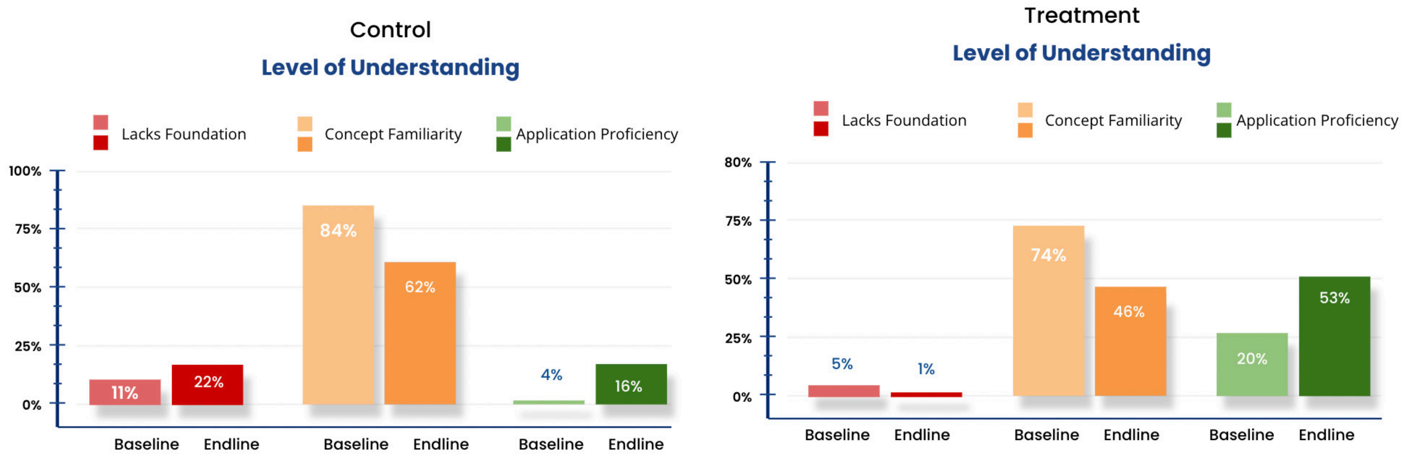


Figure 16: Grade 11 - Non-Linear Learning Gaps

3.5 Reduction of high-risk students and growth of high-performing population

Finding 9: 24x7 instant-teaching drastically reduced the number of high-risk students who struggled to obtain passing scores (less than 35%) and has brought about a transformational rise in the number of high-performing students (scoring more than 75%). While in the case of the Control group, the high-performing students reduced over time.

In both Grade 11 and 12 Mathematics, complexity of syllabus increases as each subsequent chapter builds on the knowledge of previous chapters. For instance, a clear grasp of limits is necessary to understand continuity and differentiability, which is in turn the foundation for differential calculus. Thus, as complexity of topics increased, the study noticed that **control group students who had no interventions were not able to solve questions as they lacked foundations in previous chapters.** Thus, they faced a **degrowth in learning**, with more students scoring worse in the endline assessment as compared to baseline. Meanwhile, **treatment group students with access to instant teaching support showed a distinguishable shift in performance.**

Grade 12

High-Risk Students (scoring less than 35%): At the endline, none of the students is under high-risk category (scoring less than 35%) in the treatment group. Whereas, more students has came under high-risk category from baseline to endline in the control group.

High-Performing Students (scoring more than 75%): A forward shift in the number of high performing students (scoring more than 75%) from baseline to endline is observed in treatment group. In comparison, none of the students scored above 75% at endline in case of Control Group.

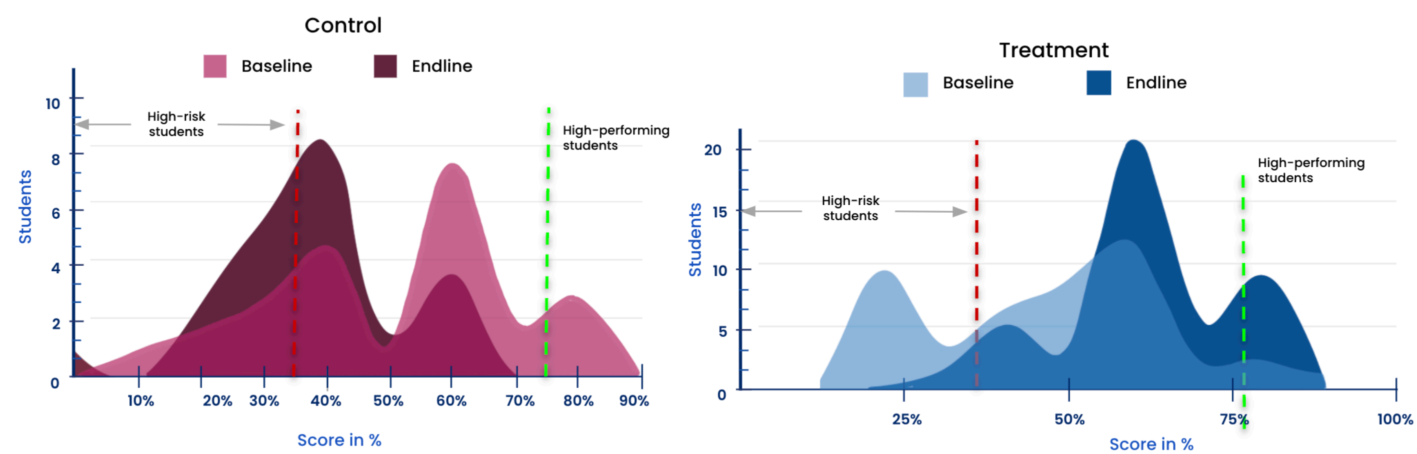


Figure 17: Grade 12 - Performance of high risk students and high-performing students

Grade 11

- High-Risk Students (scoring less than 35%): At the endline, none of the students in class 11 are under the high-risk category (less than 35%) in the treatment group. Whereas, more students have come under high-risk category from baseline to endline in the control group.
- High-Performing Students (scoring more than 75%): Majority of students have become high performing students (more than 75%) from baseline to endline in the case of the treatment group. Whereas, a slight decline in case of high performing students is observed for control group students.

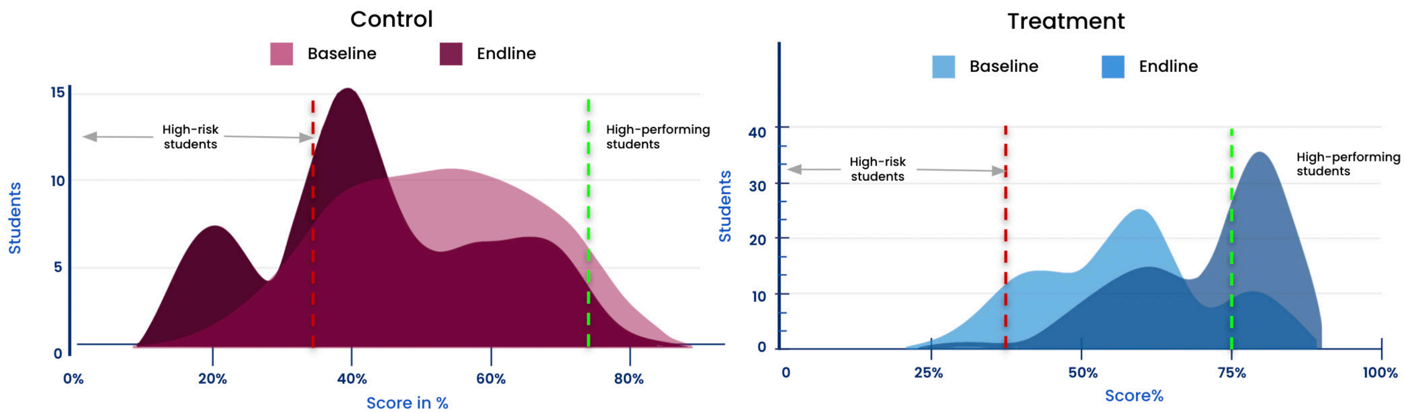


Figure 17: Grade 11 - Performance of high risk students and high-performance students

3.6 Providing personalised learning support to every student

Student's Background

A student from the Treatment Group from the sample has been chosen to demonstrate how 24x7 instant-teaching supports high-risk students by providing just-in-time, personalised interventions to fill gaps in learning and strengthen new learning, equitably and effectively.

Bipin is a class 12 Hindi speaking student from Dumka. He is from OBC category and belongs to a low income family which earns less than INR 10,000 per month. Further, he is a first generation learner in his family.

When surveyed at the start of the project, Bipin's baseline assessment score was 33% and aspired to just pass the Jharkhand Grade 12 State Board Exams. He also only intended to study until a diploma level.

Student's Background

Profile

Name	Bipin
Grade	12
Language	Hindi
Gender	Male
Location	Dumka

Socio-Economic Background

Caste	OBC
Family Income	Less than 10K pm
Father's education	Less than Grade 5
Mother's education	Less than Grade 5

Educational Background

Baseline Score	33%
State Board Marks Aspirations for 12th Grade	I will be happy if I pass the exam
Education Aspiration	Upto Diploma

Learning Engagement on the Platform

One-to one live learning sessions with subject experts helps students identify their learning ability for a particular topic and provide required learning support just at the right time (when student feels stuck) to accelerate their learning.

For instance, the below figure represents Bipin's learning abilities and his session-wise engagement on the platform for the topic - Continuity and Differentiability. Bipin spent 66 Learning minutes spent on the topic Continuity and Differentiability which resulted in significant improvement in his performance to 71.4 % in Continuity and Differentiability at the endline assessment.

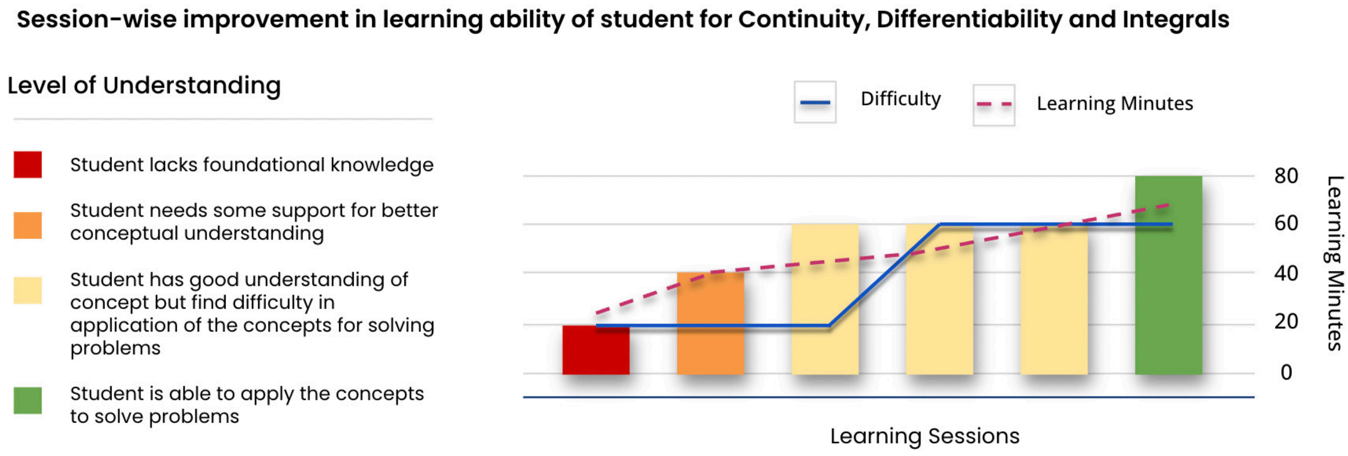


Figure 18: Session wise improvement in learning ability

Identification of Learning Gaps

Learning Gaps among students are identified based on the student's interaction with the platform and classified into four main categories using Bloom's Taxonomy:

- Student lacks foundational knowledge
- Student needs some support for better conceptual understanding
- Student has good understanding of concept but find difficulty in application of the concepts for solving problems
- Student is able to apply the concepts to solve problems

Based on Bipin's interaction with the platform, the following chart was developed to track his performance in different topics of mathematics.

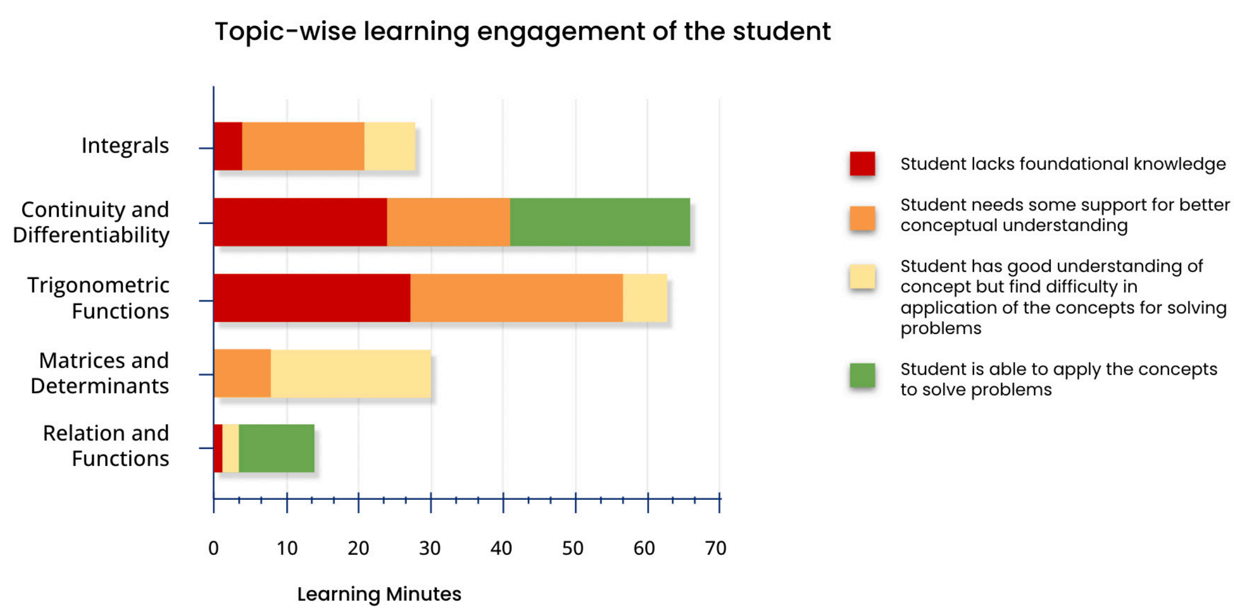


Figure 19: Bipin's learning engagement on the platform

Student's Performance and Interaction with the Platform

Bipin's performance in mathematics improved by 46.6% from baseline to endline as his interaction with the platform increased over the project duration. At around 100 minutes of usage, his Maths score was 33.3%, while after nearly 500 minutes of interacting with the platform, he was able to improve his score to 80%.

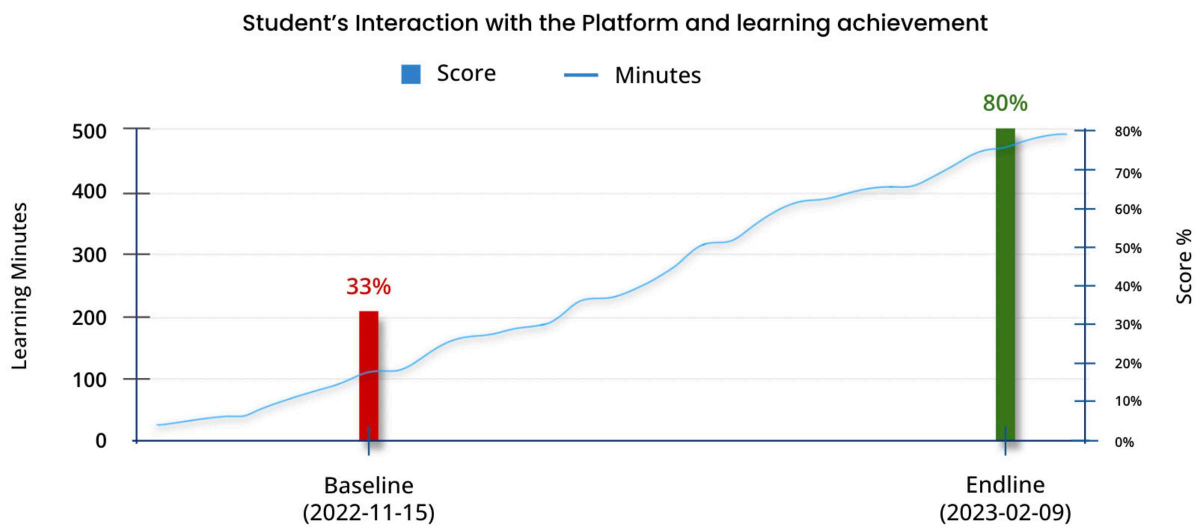


Figure 19: Bipin's learning engagement on the platform

Improvement in Learning Aspirations

Instant-teaching provided confidence to Bipin and resulted in a transformational change in his learning aspiration.

Shift in Study Aspirations: During the baseline survey, Bipin expressed that he wished to only pursue education up to diploma level. However, by the end of the project, Bipin showed enthusiasm in pursuing higher studies up to a Masters or PhD level.

Shift in Marks Aspirations: During the baseline survey, Bipin was content at obtaining passing marks and did not show interest in scoring high marks. By the endline survey, Bipin was more confident and had stronger fundamentals in Maths and wanted to score more than 90% in his state board exams.

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