UNMF - E_Learning
Executive Summary

Prepared For

Foundation

UNM Foundation

RAJIB NATH

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Prepared By

SoulAce
Path to Sustainability

SOULACE CONSULTING PVT LTD

ISO 27001:2013 Certified

DELHI NCR | MUMBAI | KOLKATA

Website: www.soulace.in; Email: enquiry@soulace.in

EXECUTIVE SUMMARY

In the context of Indian public schools, the significance of e-learning and digital literacy cannot be emphasized enough, as many students complete their education without acquiring the essential knowledge, concepts, and skills necessary for their future success. Recognizing this challenge, the Torrent Group of Companies, through the U N Mehta Foundation (UNMF) partnered with SchoolLens as their technology collaborator to develop and implement an e-learning program across 13 government primary schools in Gujarat from 2016 to 2019.

The primary aim of this e-learning initiative was to provide students in grades 5-8 with a strong academic foundation and equip them with the skills needed to navigate an increasingly digital world. The program strived to enhance students' learning experience by integrating digital tools and technology-driven educational interventions. It was designed to establish a robust conceptual foundation in various subjects, equip students with the skills to navigate the digital era's challenges, and empower them to actively participate and make meaningful contributions in an ever-evolving world.

To assess the impact of UNMF's Education CSR initiative, the E-learning program, SoulAce was commissioned to conduct a comprehensive Impact Assessment study. The study employed a mixed-methods approach, ensuring a well-rounded understanding of the program's effectiveness and outcomes. Quantitative tools in the form of written assessments in Gujarati language and mathematics were used to capture measurable evidence on the learning levels of students. Further, open-ended interviews and Focus group Discussions were utilized to obtain a comprehensive understanding of the e-learning program's effectiveness from keys stakeholders, namely, students, teachers & headteachers, and parents.

To ensure geographic diversity and adequate representation, a random sampling method was utilized to select six schools for inclusion in the study. From each of these schools, a total of ten Grade 8 students were chosen to participate in the written assessments. In addition, key stakeholders, including program team members, school principals, teachers, and parents, were selected through purposive sampling.

Location	School Name	Sample Size	
		Student Assessment	Key Stakeholders
Gandhinagar	Irana	10	2 Program Team Members 5 Teachers + School Heads, 5 Parents, 10 Students
Ahmedabad	Shardashish	10	
Banaskantha	Kodrali Primary School	10	
Banaskantha	Memadpur Pay Center School	10	
Surat	Dhoran Pardi Primary School	10	
Surat	Karjan Primary School	10	
Total		60	22

Major Findings of the Study:

Student Achievement and Comparisons with NAS Results

- Language Assessment: Beneficiary students achieved an average mean score of 63.2%, surpassing the NAS result of 53%.
- ·Mathematics Assessment: Beneficiary students achieved an average mean score of 50%, outperforming the NAS result of 36% in 2021.

Impact on Student Engagement and Learning

- Increased student engagement and enjoyment reported.
- Digital resources and interactive features contributed to higher motivation and interest in learning.

Professional Development of Teachers

- Teachers adopted modern teaching methods and enhanced digital and pedagogical skills.
- Successful incorporation of activity-based learning approaches resulted in improved student outcomes.

Parental Appreciation

- Parents expressed strong appreciation for the program's impact on their children's education and future prospects.

Reach to Low-Income Students

- Effective reach to students from low-income backgrounds, providing access to quality education.

Challenges and Recommendations:

- Continuity of learning and availability of teacher handbooks were identified as key challenges.
- Recommendations include building a robust professional learning community, expanding outreach efforts, and fostering innovation in alternative technologies.

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UNMF - E_Learning Impact Assessment Report

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CONTENT

CHAPTER 1: INTRODUCTION

1.1 Context

In today's rapidly evolving digital landscape, e-learning and digital literacy have emerged as essential components of quality education. The Sustainable Development Goal-4 recognizes this by targeting the provision of relevant skills, including technical and vocational skills, to youth and adults for employment, decent jobs, and entrepreneurship. Indicator 4.4.1 further emphasizes the need for digital literacy by aiming to measure the proportion of youth and adults with information and communications technology (ICT) skills. Furthermore, the Organisation for Economic Co-operation and Development (OECD) underscores the criticality of digital literacy skills for students to become lifelong learners and participate actively in the digital economy. Moreover, the OECD recommends leveraging digital literacy to enhance student learning outcomes, develop critical thinking skills, and foster creativity.

1.2 The Need for Digital Literacy in Public Schools of India

The COVID-19 pandemic has accelerated the shift to digital learning globally, bringing to the fore the massive digital divide that exists. In this context, digital literacy and the use of digital tools have become crucial for students to improve their learning outcomes. Acknowledging this emergent need, the Indian government has made digital literacy the core vision of Digital India, aiming to transform the country into a digitally empowered society and knowledge economy through universalizing digital literacy. However, students in public schools in India are unable to achieve the desired outcomes, and schools are struggling to cope with the rising number of children who are going through the rhythms of schooling without attaining the required competencies for future success. Undoubtedly, achieving the ambitious goals set by the SDGs and the Digital India program requires significant and robust support.

1.3 Role of Torrent Group and UNMF in Broaching the Issue

In light of the pressing need for digital literacy and e-learning in school education, the Torrent Group of Companies, through the U N Mehta Foundation (UNMF), launched the Shikshasetu program as part of its CSR activities.

The second phase of the program, conducted from 2016 to 2019, aimed to address this issue by selecting 13 government primary schools in Gujarat for implementation. One of the key components of the program was the E-learning initiative, which aimed to help students of classes 5-8 develop a strong academic foundation and equip them with the skills necessary to navigate an increasingly digital world. By incorporating digital tools and technology-based educational interventions, the program aimed to enhance the learning experience of students and equip them to meet the challenges of an increasingly digital world.

1.4 Overview of the E-learning Program

The E-learning program under Shikshasetu aimed to provide technology-based educational tools to students and teachers to improve the learning outcomes of students. The program included the following components:

Imparting Technology-Based Education Tools in Schools:
The schools were provided with the sL Ed Studio software, which includes skill-based learning applications in Mathematics, Gujarati, Science & Technology, Social Studies, and English.

Key Aspects of the sL Ed Studio:
SchoolLens Solution Private Limited (SSPL) provided the sL Ed Studio as the technology partner of UNMF. The e-learning bundle was designed to incorporate technology-based teaching tools for teachers, skill-based, self-learning tools for students, and technology-based assessment tools to measure learning improvement. Its key aspects were:

- sLate, a technology-based teaching tool for teachers based on the Gujarat State Education Board's curriculum projected in classrooms for standards 5-8.
- sLearn, a skill-based learning tool for students provided on tablets
- sLquiz, a technology-based assessment tool to measure learning improvement year on year.

Capacity Building of Teachers and School Heads:
Teachers were provided with Continuous Teacher Support (CTS) training, which aimed to improve their teaching skills and foster a culture of quality education. The training helped teachers shed misconceptions and providing them with interactive and creative pedagogies for teaching difficult concepts.

To further strengthen this component, individual consultations with subject experts were also included, enabling teachers to discuss their difficulties and seek solutions. Each teacher received subject training and consultations on two topics, based on a survey conducted to gauge training needs and assessment results. Additionally, soft skills training for teachers and leadership skills workshops for school principals were also conducted.

Sensitization of the Parent Community:

Parental cooperation and support play a vital role in achieving sustainable results for educational projects. Despite providing teachers with top-notch educational technology and training, students' regular attendance at school is a prerequisite for achieving project goals.

To this end, sensitization workshops were held in each school to inform parents about the new project and showcase the new technology provided for their children's education. On average, 200 parents attended each workshop and expressed their wholehearted commitment to ensuring their children attended school regularly.

Achrasan Primary School

CHAPTER 2: RESEARCH METHODOLOGY

The research problem aimed to assess the extent of impact generated by UNMF's CSR initiative in Education: The E-learning program. To achieve this, the Impact Assessment study employed a mixed-methods approach to obtain comprehensive and well-rounded insights into the program's effectiveness. The use of both quantitative and qualitative methods enabled the triangulation of information gathered from multiple sources, resulting in greater validity and reliability of the study's conclusions than if only one method was used.

2.1 Quantitative Tools

The Impact Assessment study conducted to measure the impact of the E-learning program utilized quantitative tools to capture measurable evidence on the learning levels of students. Quantitative tools involve the use of numerical data and statistical analysis to measure and quantify changes. As per the research objectives, written assessments in Gujarati Language and Mathematics were employed as quantitative tools to capture measurable evidence on the learning levels of students in the study.

2.1.1 Assessment Framework and Design

Written assessments for Grades 8 were constructed with the twin goals of measuring students' existing learning levels and diagnosing the missing pieces or hard spots in conceptual understanding of the Gujarati language and Mathematics. Towards this end, measurable learning outcomes were defined and mapped to key conceptual areas in the Gujarati and Mathematics curricula to ensure optimal coverage, grade-level appropriateness, and content validity.

2.1.2 Item Format

In order to construct the assessment framework, consultation with experts in the field of assessment and the Gujarat state curricula for language and mathematics was carried out. The aim was to ensure that the item types used were familiar to students and that the conceptual areas emphasized aligned with the weightage assigned to them in the school curriculum. The assessment items were designed as objective-type questions in order to cover a wide range of learning outcomes for a given conceptual area. This design was intended to minimize scoring bias and optimize the use of time. Additionally, the items were kept independent of each other, and for multiple-choice items, appropriate distractors were chosen to maintain a reasonable level of difficulty.

The assessments in Gujarati language and Mathematics were designed to target key building blocks in language and mathematical learning and to identify conceptual areas that would inform the assessment framework. The Gujarati language assessment tool was based on 4 core conceptual areas and the Mathematics assessment tool was based on 6 core conceptual areas as listed below:

Language	Mathematics
Decoding	Number System
Vocabulary	Operations on Numbers
Grammar	Measurement
Comprehension	Geometry
	Algebra
	Data Handling

2.2 Qualitative Methods & Tools

The qualitative approach provides in-depth information on some of the more intangible factors like experiences, perceptions, motivations, and processes that throw light on causal factors behind the quantitative findings. Qualitative methods are relatively more open, informal, and unstructured and increase the credibility and authenticity of quantitative findings. The study used the following qualitative tools to engage with the beneficiaries and key stakeholders to capture qualitative data.

2.2.1 Open-ended Interviews

In order to obtain a comprehensive understanding of the e-learning program's effectiveness, open-ended interviews were conducted with key stakeholders. These stakeholders included program team members, school principals, teachers, and parents. The interviews were designed to elicit feedback on various aspects of the e-learning program, including its strengths, challenges encountered in implementing it or engaging with the digital curricula, and the support that was provided to address any concerns. Additionally, the interviews aimed to gather stakeholders' opinions on the efficacy of e-learning as a strategy to enhance learning outcomes.

2.2.2 Focus Group Discussions (FGDs)

To gain insights into the students' experiences with the e-learning program, the research team conducted FGDs with a select group of students. These discussions aimed to gather students' opinions on the effectiveness of the e-learning program and how it influenced their learning motivation.

The FGDs also explored the challenges that the students encountered when using digital tools and their views on how these could be addressed. Through these discussions, the research team gained a deeper understanding of the student's perceptions and experiences, which helped to inform the overall evaluation of the e-learning program's impact.

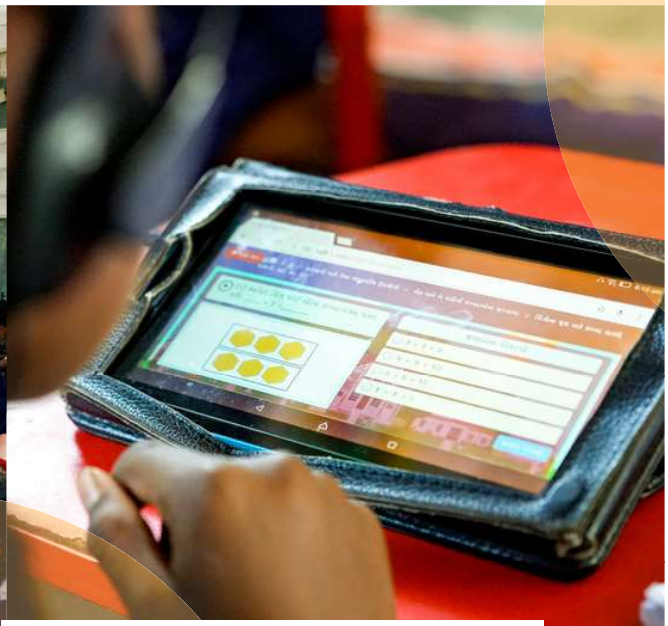
2.3 Scoring and Data Processing

To ensure accuracy and efficiency in the grading process of students' responses, macro-enabled data entry formats were designed, enabling automatic grading. This approach not only minimized the potential for errors but also proved to be a time-efficient and cost-effective means of grading. The graded data was then analyzed using specialized software tools, including Excel and Tuvalabs, to derive meaningful insights into the students' learning levels and progress.

2.4 Data Analysis

The mean scores in Gujarati language and mathematics were analyzed and compared with the baseline scores to measure the improvement in learning outcomes. Additionally, the distribution of individual scores in each subject was examined to identify the current proficiency and any areas of weakness or difficulty that may require targeted interventions. The qualitative data was utilized to complement the quantitative data, enabling the identification of patterns and providing additional insight into the findings generated through the quantitative analysis.

E-learning Lab in Action



A Tablet in Use

2.5 Sampling Framework

To ensure geographic diversity, a random sampling method was utilized to select six schools for inclusion in the study. From each of these schools, a total of ten Grade 8 students were chosen to participate in the written assessments. In addition, key stakeholders, including program team members, school principals, teachers, and parents, were selected through purposive sampling.

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Total		**60**	**22**

Interview with Principal at Shardashish Primary School

CHAPTER 3: OVERALL QUANTITATIVE FINDINGS FROM STUDENT ASSESSMENTS

To evaluate the long-term impact of the E-learning program, an assessment was conducted for students in Grades 8 from 6 selected schools in language and mathematics to measure their current learning levels. The assessment aimed to determine the extent to which these students had met the learning objectives for Grade 8 as specified by the state curriculum. In this chapter, a summary and analysis are presented to compare the students' overall performance with the National Achievement Survey, 2021 results for Gujarat, as well as their performance in the baseline assessment administered pre-intervention in 2017.

3.1 Comparison of Overall Performance in Mathematics and Language with NAS, 2021, Gujarat

The exhibit below compares the average scores obtained by Grade 8 students in the endline assessments for Gujarati and Mathematics to the average scores obtained by Grade 8 students in Gujarat in the National Achievement Survey conducted in 2021.

1. Comparison of Performance in Endline and NAS,2021

Source: NAS, 2021, Gujarat, State Report Card

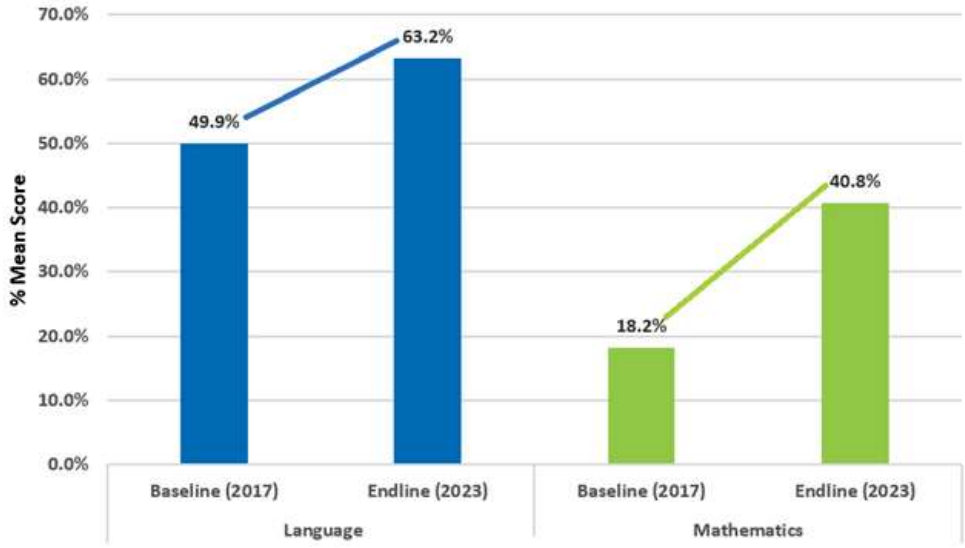
It is worth mentioning that the mean score of the students in the intervention group exceeded the average mean score at the state level for both the subjects, i.e., Gujarati language and Mathematics. The difference in the performance of the intervention group students as compared to the state average was 10% and 14%, respectively, for Gujarati and Mathematics.

Despite this difference, the language assessment scores were found to be comparatively better than the mathematics scores. These findings are in line with the outcomes of worldwide post-pandemic assessments, which also reported a decline in language and mathematics scores, with the latter showing a greater decrease.

3.2 Comparison of Overall Performance with the Baseline

Students' overall mean scores in language and mathematics were further compared to the scores obtained in the baseline assessment administered in 2017.

2. Comparison of Performance in Baseline and Endline



The analysis included a comparison of the student's overall mean scores in language and mathematics in the endline assessment with those obtained in the baseline assessment conducted in 2017. The findings indicated a significant improvement in mean scores in both language and mathematics. Specifically, the mean score in language increased by 13.3 percentage points, while that in mathematics increased by 22.6 percentage points.

The qualitative data analysis provided further support for the findings, indicating that the schools that had taken part in the E-learning program had an advantage in transitioning to digital learning. The schools' prior experience with digital tools and devices made them better equipped to deliver continuing education to their students, thereby reducing the learning loss experienced by students in other schools.

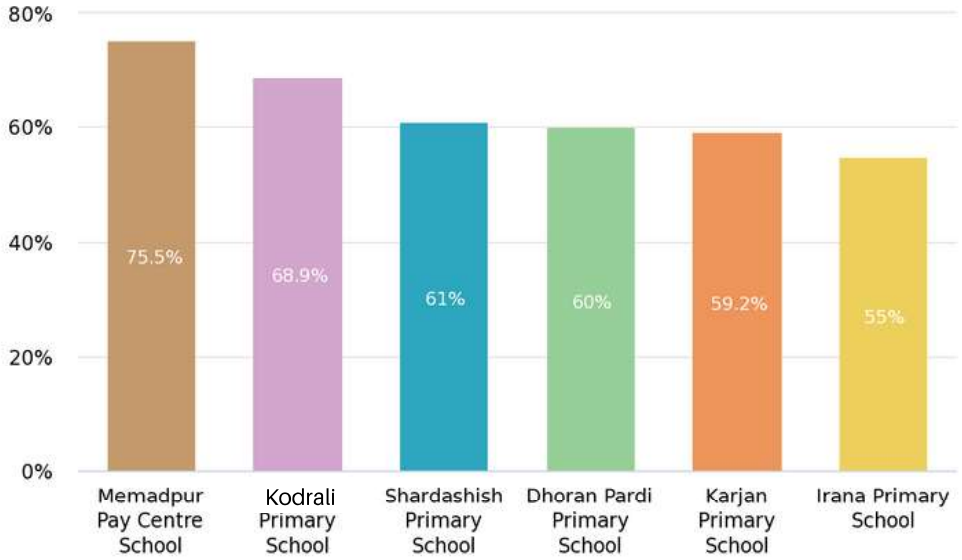
3.3 Overall School-wise Performance

In addition to analyzing the overall performance of schools in language and mathematics, the study also examined the intraschool variability in performance across language and mathematics. The purpose of this analysis was to identify the specific areas where schools might need additional support emphasizing the need for ongoing support to sustain and build upon the progress achieved through the E-learning program.

3.3.1 Performance in Language

The exhibit below summarizes the performance of the 6 schools in language.

3. School-wise Performance in Language

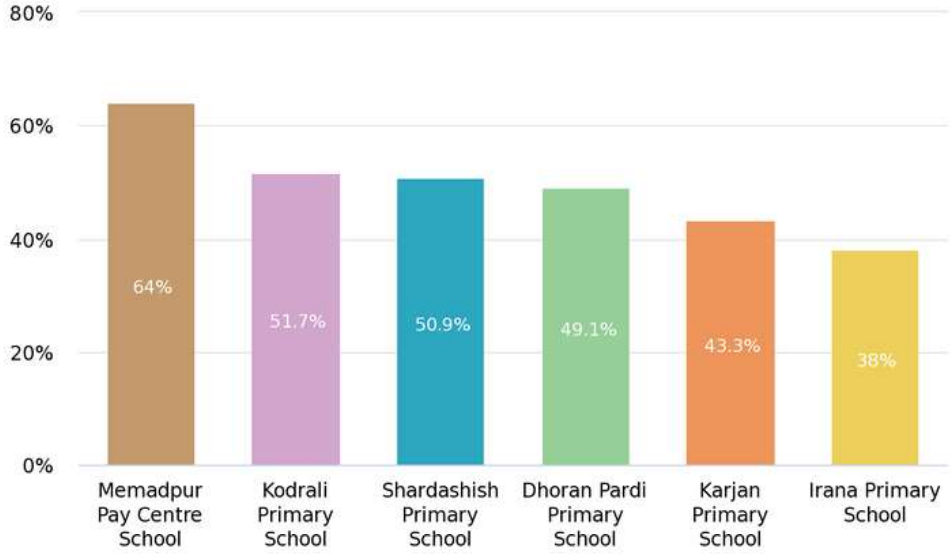


The analysis of the scores showed that all six schools scored above 55% in language. The top scorers were Memadpur Pay Center (75.5%), Kodrali Primary (68.9%), and Sharadashish Primary (61%) schools. Irana Primary School registered the lowest mean score at 55%.

Interview with principal Achrasan school

3.3.2 Performance in Mathematics

4. School-wise Performance in Mathematics



The mean scores in mathematics showed considerable variability across the schools with Shardashish Primary School scoring as low as 38% and Memadpur Pay Center School scoring 64%. 3 schools scored under 50% in mathematics while 3 scored above 50%.

In conclusion, the study shows a significant improvement in the mean scores of both language and mathematics from the baseline assessment conducted in 2017. The intervention schools outperformed the NAS average in language and mathematics. However, there was still a notable intra-school variability in language and mathematical performance, highlighting the need for additional support and interventions to ensure sustained progress and continued growth for these schools.

Interview with School Teacher at Shardashish Primary School

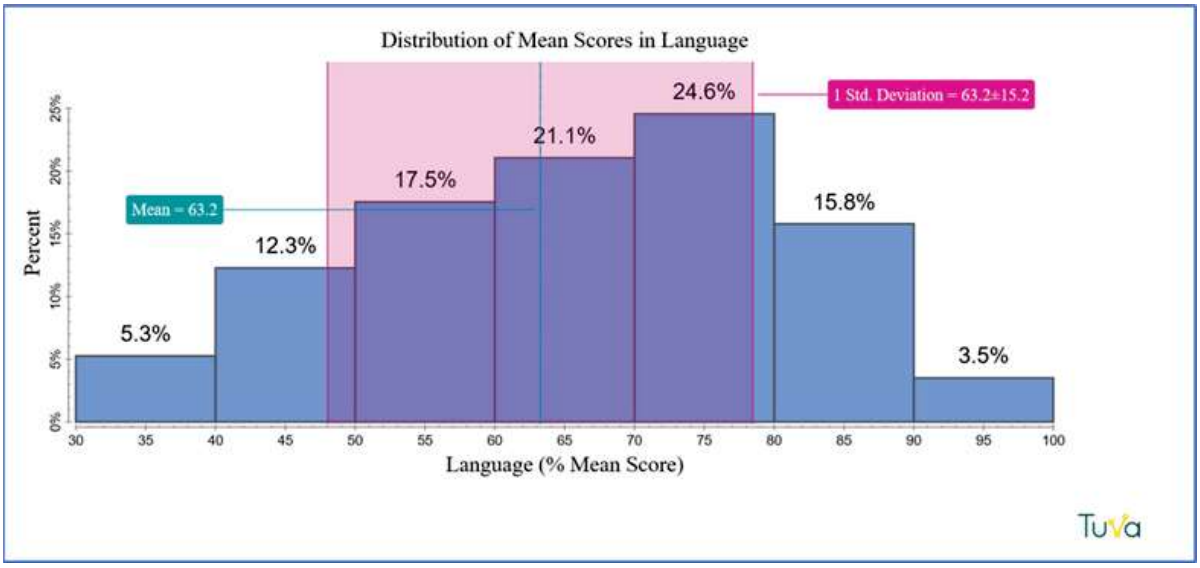
CHAPTER 4: DETAILED QUANTITATIVE ANALYSIS OF PERFORMANCE IN LANGUAGE

Language plays a vital role in learning, serving as the medium for classroom interactions and learning across all subjects. Research has consistently shown that the ability to process information and make meaning is crucial for academic success and cognitive development. Additionally, language proficiency has lasting benefits, such as effective communication, self-expression, creativity, and active participation in society. Despite the humble immediate objectives of language learning in primary and middle school, these skills progressively contribute to larger goals. However, large-scale assessments such as the Annual Status of Education Report (ASER) and the National Achievement Survey (NAS) have revealed that a significant percentage of primary and middle school students (Grades 4-8) struggle to read basic texts at the Grade 2 level.

This chapter provides a comprehensive examination of the language assessment results aimed at evaluating the efficacy of the E-learning program in augmenting the academic achievements of Grade 8 students. The focal themes of the assessment encompassed the domains of Decoding, Vocabulary, Grammar, and Comprehension.

4.1 In-depth Analysis of Performance in Language

The exhibit below shows the distribution of mean scores for all the Grade 8 students across the 6 schools.



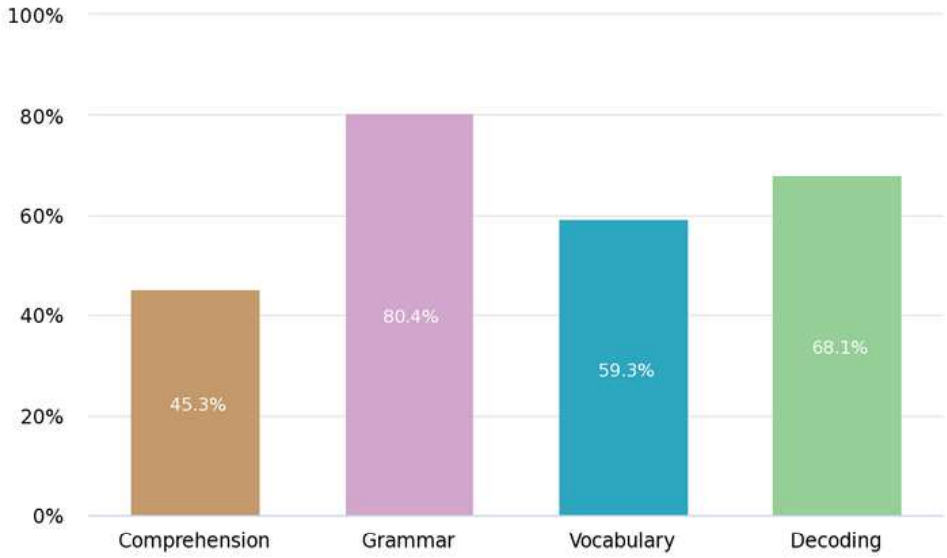
Graph Generated in Tuva Labs

The distribution of mean scores in the language is roughly normal with a slight skew on the left indicating that a larger proportion of students scored higher marks. Further, the standard deviation of the scores was 15.2% showing the variability in the scores within the group. Around 44% of the students scored 70% and above and only 5.3% scored between 30-40%. Approximately, 38% of the students scored between 50-70%.

4.2 Conceptual Area Wise Performance in Language

The study further analyzed the performance in different conceptual areas in language to get a more granular view of the hard spots and to identify the thrust areas for improving the intervention. The exhibit below summarizes the mean scores of the students in each of the four conceptual areas measured in the assessment.

5. Conceptual area wise Performance in Language



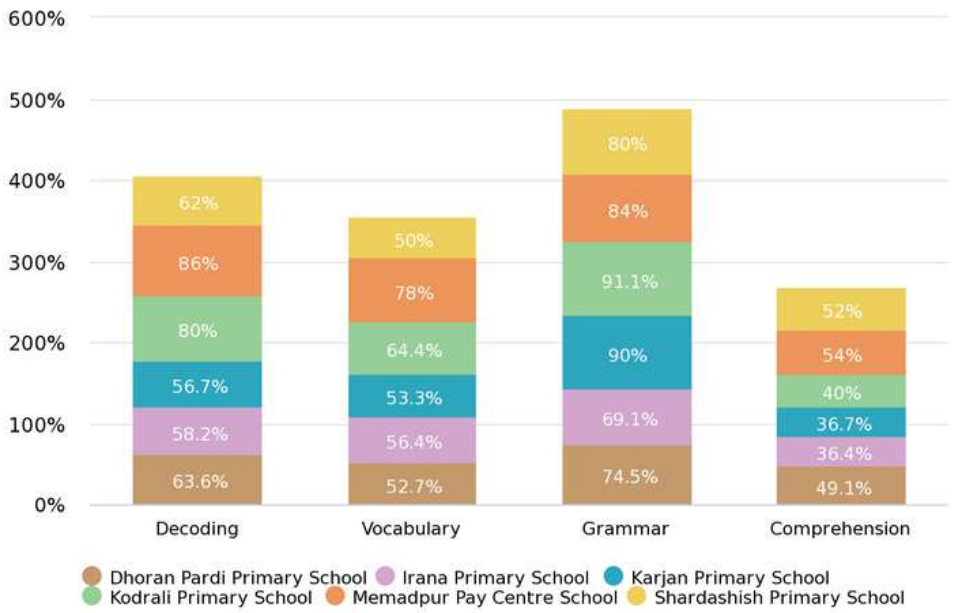
Considerable variability was found in the mean scores across the conceptual areas. Students scored the highest in grammar at 80.4% indicating that they have a strong fluency in the morphology and syntax of the language. The lowest mean score was registered in comprehension at 45.3% indicating that students need further inputs on the sub-constructs of identifying, retrieving, interpreting, and reflecting to be able to make meaning, reason, and draw contextual inferences from a piece of text.

The mean score in decoding was found to be 68.1% indicative of a fair understanding of the application of the alphabetic principle to recognize and analyze words structurally. Lastly, the mean score in vocabulary stood at 59.3% indicating a moderate application of decoding as well as word recognition skills.

4.3 Conceptual Area Wise Performance in Language by School

The exhibit below summarizes the means scores in each conceptual area by school.

6. Conceptual area-wise average of percentage scores in Gujarati across different schools



After conducting a school-wise analysis of performance across key conceptual areas, it was found that 4 out of 6 schools scored 80% and above in grammar, while 2 out of 6 schools scored 80% and above in decoding. The mean score for comprehension was below 55% for all 6 schools, with Irana Primary School recording the lowest score at 36.4%, followed by Karjan Primary School at 36.7%. Vocabulary scores showed significant variability, with Sharadashish Primary School scoring the lowest at 50% and Memadpur Pay Center School scoring the highest at 78%.

Despite the challenges posed by the COVID-19 pandemic, resulting in nationwide school closures and learning loss, the overall performance in language was relatively commendable. Qualitative interviews corroborated the finding that UNMF has been providing continued support to the schools during and after the pandemic, which may have contributed to the good performance. However, the analysis revealed a significant gap in higher-order skills such as comprehension and vocabulary across schools, which require prompt attention. Additionally, the study found notable intra-school variability in language performance, underscoring the need for further support to maintain the gains from the E-learning program.

Memadpur

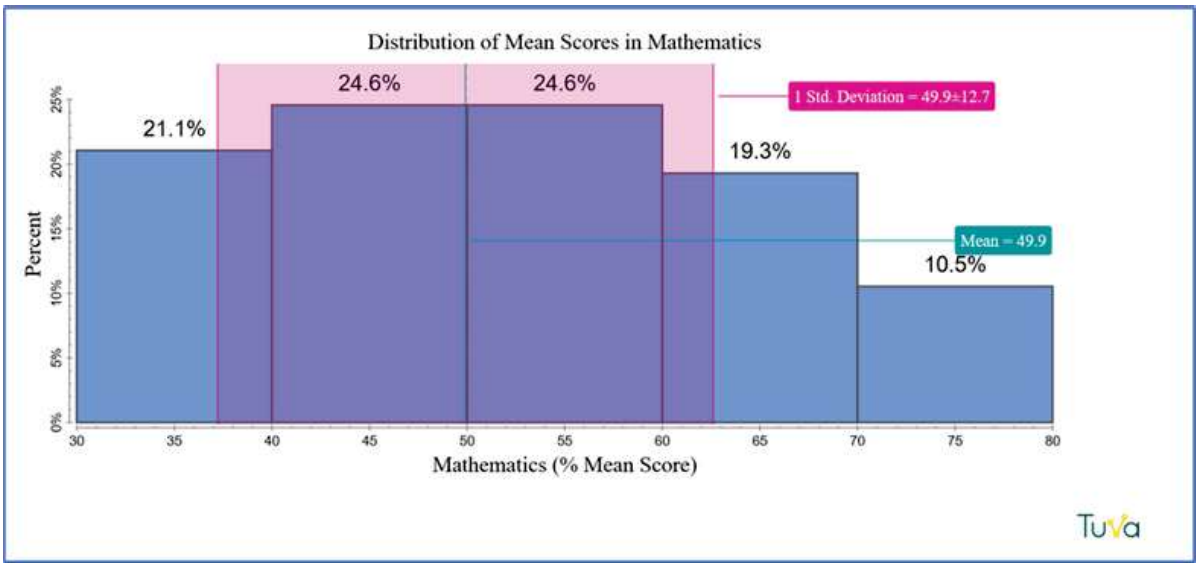
CHAPTER 5: DETAILED QUANTITATIVE ANALYSIS OF PERFORMANCE IN MATHEMATICS

Numeracy skills for adults refer to the ability to use, interpret, communicate, and access mathematical information in various situations to manage the demands of adult life (OECD, 2013). The importance of mathematical learning in primary and middle school, as the foundation of these skills, is evident in this definition. Mathematical learning also plays a crucial role in developing abstract mental capacities, and in today's fast-paced world overflowing with information and data, it serves as a "gatekeeper" to exciting domains of learning in higher education and employment opportunities with high returns. However, despite global, national, and state-level efforts to make mathematical learning relevant to students, evidence from NAS and ASER tests reveals that too many students lack even the most basic mathematical skills.

To measure the impact of the E-learning program in enhancing the academic achievements of Grade 8 students in mathematics, an assessment was administered across the 6 selected schools. The assessment included four key conceptual strands and associated sub-constructs: Number System, Operations on Numbers, Measurement & Geometry, and Data Handling & Algebra. Performance in these areas indicates the learner's aptitude in understanding quantities, space & shape, change & relationship, and variability & uncertainty. This chapter presents the findings of the in-depth quantitative analysis of the performance in Mathematics.

School Staff_Kodrali

5.1 In-depth Analysis of Performance in Mathematics



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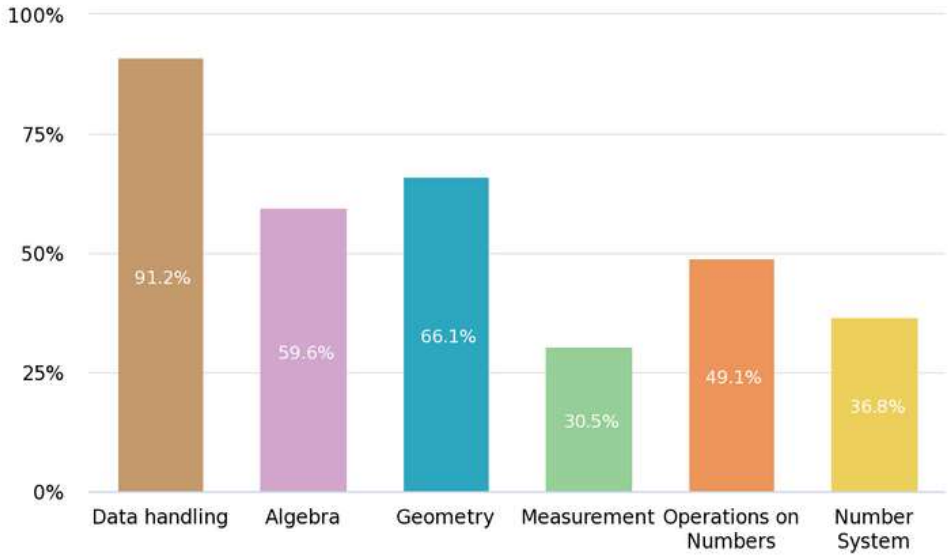
The distribution of mean scores in mathematics is also near-normal, except for the slight skew on the right. However, the scores show less variability as compared to language with a standard deviation of 12.7%. In contrast with the performance in language, only 10.5% of the students scored between 70-80%. Around 44% of the students scored between 50-70% while the proportion of students scoring below 40% was 21%.

Community Mothers_Bawalchudi

5.2 Conceptual Area-Wise Performance in Mathematics

To gain a more detailed understanding of the strengths and weaknesses of the intervention, the study conducted an analysis of the student's performance in mathematics across different conceptual areas. The exhibit below presents the average scores of students in the four measured conceptual areas. This analysis helped to identify the areas that require greater attention and improvement within the intervention.

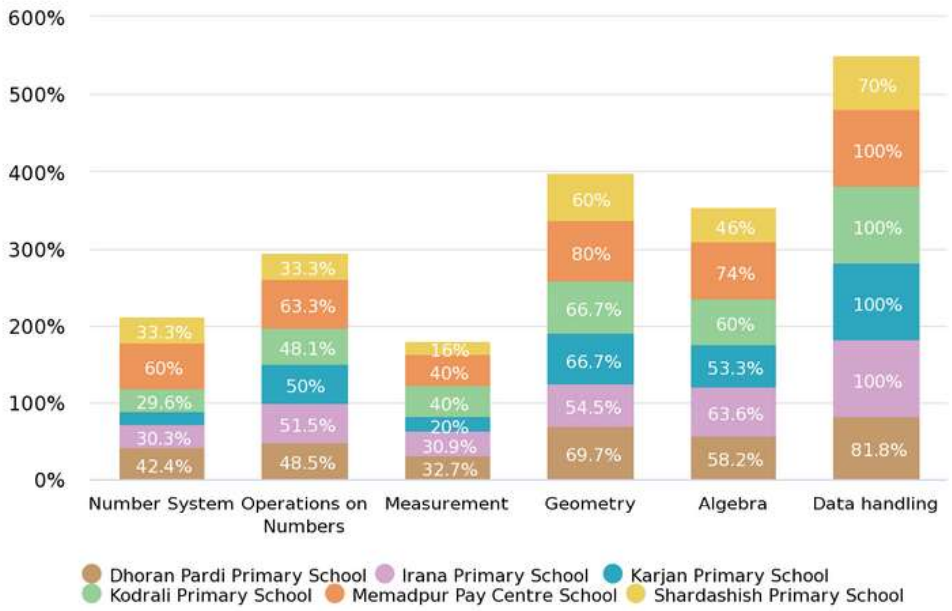
7. Conceptual area wise average of percentage scores in Mathematics for 6 schools taken together



The findings indicated that three out of the six conceptual areas assessed - Operations on Numbers, Number System, and Measurement - had mean scores that were below 50% (49%, 37%, and 31% respectively). The sub-constructs covered in the measurement domain included operations on standard units of length and time. Under the Number System, students were evaluated on their understanding of large whole numbers, divisibility, and factorization, while Operations on Numbers encompassed operations on whole numbers and decimal numbers in real-world contexts. In contrast, the highest mean score was observed in Data Handling, with a score of 91%, followed by Geometry and Algebra, with scores of 66% and 60% respectively.

5.3 Conceptual Area Wise Performance by School

8. Conceptual area-wise Performance in Mathematics by School



Among the six schools studied, Memadpur Pay Center school exhibited superior performance in all six conceptual areas of mathematics, while Shardashish Primary School consistently scored the lowest in all but one conceptual area. Interestingly, four out of the six schools achieved a perfect score of 100% in Data Handling, while four schools scored above 55% in Algebra and five schools scored over 55% in Geometry. However, the overall performance in Measurement was relatively poor, with all six schools scoring 40% or below. Similarly, four schools scored 50% or below in Operations on numbers, while four schools scored below 35% in Number System.

In conclusion, the study revealed that students' performance in mathematics had less variability as compared to language, with a standard deviation of 12.7%. However, the scores showed that only a small proportion of students scored between 70-80%, while a considerable proportion of students scored between 50-70%. The analysis of student's performance across different conceptual areas identified three areas that require greater attention and improvement: Operations on Numbers, Number System, and Measurement. Notably, Memadpur Pay Center school outperformed the other schools in all six conceptual areas, while Shardashish Primary School consistently scored the lowest in all but one conceptual area. These findings underscore the need for targeted interventions to improve mathematics education in the intervention schools.

CHAPTER 6: FINDINGS OF THE QUALITATIVE INTERACTIONS

This impact assessment of the E-learning program took a comprehensive approach by engaging with key stakeholders across the study locations to obtain their perspectives. By delving deeply into their viewpoints, this study surpassed surface-level analysis and achieved a more nuanced understanding of the program's impact. It also attempted to identify barriers, if any, that hindered the program's effectiveness. The findings of this study, presented in this chapter, are based on both quantitative and qualitative data, providing a well-rounded assessment of the program's impact. Additionally, this analysis was used later in the report to provide actionable recommendations to enhance the program's effectiveness.

6.1 Implementation Team

The research team fostered a comprehensive understanding of the program's strengths and potential barriers, from a programmatic perspective, by engaging in in-depth dialogues with the technical field supervisors across all study locations. This enabled the team to gain deep insights into the implementation of the program and to identify factors that could have impacted its effectiveness.

It was reported that the E-learning program was implemented in 13 schools across Ahmedabad & Chaapi, Chhatral, and Surat clusters in Gujarat where UNMF had provided projectors 20 smart classes, and 1247 tablets. Teachers were trained on the software and content by UNM's technology partner, schoolLens Solutions Private Limited (SSPL). Additionally, Field Technical supervisors (FTS) (one in each cluster) were deputed to support teachers and schools. To monitor content usage, an online dashboard was created, providing a comprehensive overview of the program's implementation and progress.

The FTS played a crucial role in the E-learning program, visiting schools on a regular basis to ensure the smooth running of the technology infrastructure. They reported any issues or problems to the relevant authorities, collected data on sL Ed-Studio usage, and provided support during school activities and emergencies. They also assisted with self-learning when required and provided information on the education software and apps to teachers and students. Their presence and support were vital in ensuring the smooth implementation of the program and its continuous monitoring.

Key Components of the E-learning Software, sL Ed Studio

sLate is a comprehensive tool designed for teachers to enhance classroom teaching effectiveness and student engagement. It covers the complete curriculum from GSEB (Gujarat State Education Board) Textbooks, created by GCERT (Gujarat Council for Education Research and Technology) for all subjects for standards 5 to 8 in Gujarati Medium Schools.

sLearn is an Adaptive Learning Platform for students, using a Blended Interactive Learning methodology specifically for Gujarati Medium Schools. The platform includes various activities delivered through an adaptive self-learning interface that helps students build essential life skills, such as logical and analytical thinking, decision-making, creative and design thinking, and communication.

It offers interactive activities, games, puzzles, and more to help students learn and develop these skills at their own pace. The platform is designed to understand each student's level and adjust to provide relative challenges, allowing students to improve their skills as they progress.

sLQuiz is a technology-based skill assessment platform for students, typically used at the beginning of an academic year to evaluate skill and conceptual understanding levels for each student. Once assessments are completed, a customized annual activities calendar is created for each school. The platform is fully automated with an integrated analytical engine and reporting capabilities that generate test results immediately, providing appropriate recommendations for students, teachers, and principals based on the test results.

Infrastructure Training:

Having a powerful server with specific hardware specifications was crucial for the successful implementation of the E-learning program. The recommended server, the Lenovo TS150 Server or equivalent, had a fast processor speed of at least 2.4 GHz and a minimum of four cores, along with 15 GB of RAM and a 2 TB hard disk. The operating system was Windows Server 2012 or later.

The Tablet Lab also included 30 tablets with a minimum screen size of 7 inches, running on Android with a RAM of 1+ GB and a processor speed of 1 GHz or faster. A network router (RUCKUS R500 or equivalent) was installed to support 30+ tablet-based users and a network connection to the server or LAN connections for all the PCs inside a lab.

Meeting these hardware requirements ensured that the E-learning program could run smoothly and effectively. It allowed for real-time monitoring of individual student progress, immediate access to learning materials, and the ability to seek help when needed. Ultimately, having the necessary hardware in place was essential in enabling teachers and students to fully engage with the program and achieve the desired learning outcomes.

Monitoring Student Progress:

Using a centralized dashboard in the admin station, teachers were able to monitor the progress of individual students in real time. In case a student had difficulty understanding a concept, they could re-run a video tutorial to self-learn. However, if the student failed to understand the concept after three attempts, they had the option to click on the "Teacher's icon" (helpline button) to seek assistance from their teacher. This feature allowed for personalized support and ensured that students received the help they needed to understand a concept.

In addition to the regular lessons, the sL Ed Studio software had an inbuilt formative assessment feature. At the end of each lesson, students would solve a worksheet, and after completing 2-3 lessons, they would attempt a more comprehensive question paper. These assessments were designed to help students test their understanding and identify areas that needed improvement. Teachers could access and download these assessments and use them to evaluate student performance.

Apart from regular assessments, the software also had a fun game format called "Kaun Banega Champion" that students could use for revision. The game added an element of excitement and interactivity to the learning process, encouraging students to engage with the content in a fun way.

Additionally, the sL Ed Studio was also used for summative assessments, which were conducted thrice a year using the sLQuiz feature. The sLQuiz feature allowed teachers to create customized assessments and tests that could be taken by students online. This feature simplified the process of conducting assessments and allow for quick and easy evaluation of student performance.

Learning Management System:

The Learning Management System (LMS) deployed in the E-learning program proved to be highly efficient as it allowed teachers and school heads to easily access students' report cards, class performance, and subject-wise progress. It also provided an overview of the school's performance and progress, enabling the stakeholders to monitor and evaluate the impact of the program.

This feature was crucial as it allowed teachers to identify areas where students were struggling and provided them with the necessary support and interventions. It also enabled school heads to make data-driven decisions to improve the overall performance of the school. The system provided a comprehensive overview of the program's impact, making it easier to identify areas of success and areas that required improvement. Overall, the Learning Management system enhanced the impact of the program by providing stakeholders with actionable insights and enabling them to make informed decisions to improve the quality of education.

Program-Level Monitoring and Evaluation:

The E-learning program was subject to rigorous monitoring and evaluation to ensure its success and effectiveness. The program-level monitoring and evaluation were carried out through the centralized admin station, which provided real-time access to data on student progress, teacher performance, and overall program performance. The data was accessible to the technical head and director of schoolLens Solutions Private Limited (SSPL) as well as the UNMF team, ensuring transparency and accountability.

To further enhance the monitoring and evaluation process, the FTS created daily reports for the SSPL technical head, documenting any issues or challenges faced during school visits. Weekly usage reports were also generated to monitor the overall usage of the software and hardware. Additionally, the FTS created monthly detailed reports, providing an overview of all hardware and software issues, their resolutions, visits to schools, troubleshooting, and solutions.

This monitoring and evaluation process was crucial in identifying any potential issues and challenges faced during the implementation of the program. It allowed for timely interventions to be made, ensuring the program's success and overall effectiveness.

The data collected also provided insights into the program's impact, which could be used to inform future program development and implementation.

6.2 School Heads and Teachers

To evaluate the effectiveness and impact of the E-learning program, the research team conducted interviews and focus group discussions (FGDs) with school heads and teachers. These interactions aimed to gather their overall perception of the program, the changes brought about in their own practices, and how it affected the school ecosystem. The team also sought to identify any barriers or challenges faced by the educators while implementing the program and solicited suggestions for improvement.

Out of the principals and teachers who were interviewed, 73% had been associated with the program for over 7 years and had a good understanding of it. The stakeholders unequivocally appreciated the program goals and expressed deep gratitude to UNMF for implementing them in their schools.

Experience with the E-learning Program:

The teachers appreciated the program's formative assessments and game-based revision modules, which enhanced student engagement, especially for science and math. The use of digital resources and technology helped in making various topics easily understandable. The availability of study materials and self-learning features on the sLearn app was also praised. Teachers found it easy to teach various concepts using this program and it saved them time and resources.

During the pandemic, the program proved even more valuable as teachers had to teach online using the Microsoft Teams app. Since they were already trained in e-learning, they did not encounter any technical difficulties.

> The program has led to the adoption of modern teaching methods, including activity-based learning, tailored to the student's learning level. Teachers have improved their soft and digital skills through the program, allowing them to create skill-based question tests and focus more on activity-based learning. This has led to increased student interest and improved learning and reading levels, as well as an increase in students pursuing higher education. The program has also fostered students' curiosity, allowing them to learn independently.
>
> **-Surekha Patel, Assistant Teacher, Sharda Mandir Prathmik Shala, Indrad**

Impact on Students' Achievement:

The teachers reported that the use of digital learning had a positive impact on students. They were more motivated and engaged in learning as it became interesting for them. This led to an increase in their curiosity, which resulted in more self-learning and revision. The use of digital resources also led to an overall improvement in learning outcomes. Students were able to develop their writing skills and became more self-confident in their abilities. Moreover, the program instilled discipline among the students in their approach to learning and also led to an improvement in attendance. Overall, the use of digital learning had a positive impact on students, leading to increased engagement, motivation, skill development, and improved learning outcomes.

Teachers' Professional Development:

The E-learning program had a significant impact on the professional development of teachers by enhancing their subject matter knowledge, soft skills, and digital skills. The program enabled teachers to adopt hybrid teaching methods, incorporating activity-based learning to make teaching and learning more effective. The training provided by the program equipped teachers with the necessary digital skills to incorporate technology into their teaching practices.

As a result of the program, teachers found it easier to maintain teaching plans, track student progress, and modify their teaching techniques to suit individual needs. The program also allowed teachers to understand their students' learning levels better, which enabled them to teach at the appropriate level. This holistic approach to teaching has resulted in better student outcomes and increased teacher satisfaction with their work.

> I have really enjoyed using Tablets for learning various subjects. The level-based learning and videos have been particularly helpful in increasing my motivation and interest in learning. I have noticed a significant improvement in my understanding of subjects and my grades since using the tablets. What I love most about learning through modern methods with digital gadgets is that it's never boring, and I am always engaged. I wish we could have even more time to use the Tablets for learning.

-Krunal Parmar, 7th Grade, Sharda Mandir, Prathamik Shala

6.3 Students

The FGDs with students revealed that they were impressed with the E-learning program's user-friendly interface, which allowed for easy navigation and access to the resources. They appreciated the program's interactive approach to learning and working with tablets and digital resources.

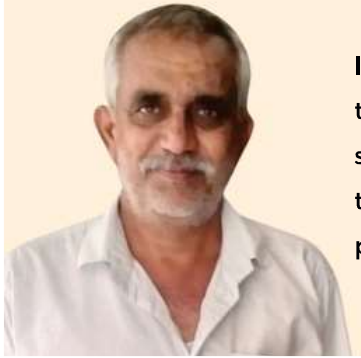
Although there were occasional technical issues, they were quickly resolved, and the students' learning experience remained largely uninterrupted. The program's emphasis on digital technology and interactive learning resulted in a significant improvement in their motivation and interest in learning, making the experience more enjoyable and fulfilling.

Jaswant Singh Solanki Prajapat is a highly experienced and knowledgeable educationist, currently serving as the principal of Chaapi School in Banaskantha district. According to him, sLearn technology has been instrumental in helping teachers gain subject-matter expertise, digital literacy, and soft skills. The thorough training provided to teachers through camps has enabled them to successfully incorporate technology into their lesson plans.

The implementation of sLearn technology at our school has resulted in a marked improvement in student engagement and learning outcomes. For instance, students have exhibited more effective reading, writing, and problem-solving skills, all of which have been a direct result of the program.

Fortunately, we have not encountered any significant challenges in implementing the program. The school management committee and parents have actively supported and contributed to the program's success.

To further enhance the program's effectiveness, we plan to continue our collaboration with Torrent and maintain program activities throughout the year. This is expected to bring about even greater success in enhancing student learning outcomes.



In conclusion, our experience with the e-learning program and sLearn technology has been overwhelmingly positive. We believe that the program has significantly improved teaching and learning at our school and contributed to the professional development of our teachers. We remain optimistic that this program will continue to benefit our students and teachers in the future.

6.4 Parents

The majority of students who benefited from the program come from families with low to poor income, with a monthly income ranging from Rs 5000-15,000. Most of their parents are engaged in daily wage labor, private jobs, small businesses such as shops, or agriculture. The mothers are primarily housewives. Despite not having a clear understanding of the program's underlying pedagogy, all the parents interviewed expressed deep gratitude towards the program.

It was evident from the conversation that the parents recognized the significance of digital devices and apps in improving their children's learning outcomes and providing them with opportunities for better education and future prospects that they themselves could not afford due to their socioeconomic circumstances. The program was seen as a way of leveling the playing field for their children and bridging the educational gap between them and their more privileged peers.

"As a student at Kodrali School, **Divyan** is thrilled about using tablets in his classes. He is studying in 6th grade. He mentioned that the sLearn app on his tablet has completely transformed the way he learns, and he finds it very engaging and interactive. He enjoys using the app to access educational resources, take quizzes, and complete assignments.

What he likes best about using the tablets in his classes is that he can access all his study material in one place, and it makes learning more convenient and fun. The tablets have also helped him to be more organized and productive in his studies. He finds it exciting to explore the various educational resources available on the app, and it has made learning more enjoyable and fulfilling. He has also noticed a significant improvement in his grades and understanding of the subjects since using the tablets.

He feels more engaged in his classes when using the tablets, and it is because the interactive features of the app keep him involved and interested in the learning process. Using tablets in his classes is way better than traditional classes in terms of making learning interesting and fun. It has inspired him to come to school more often and look forward to his classes. Overall, he is very happy with the e-learning program at Kodrali school, and he feels it has been a unique and innovative way of learning."

CHAPTER 7: ASSESSMENT OF IMPACT & THE WAY FORWARD

The research study set out to assess the immediate and long-term impacts of the E-learning program implemented by the UNMF, which worked towards enhancing the educational outcomes of the public-school children in Gujarat using digital tools. This chapter summarizes the major impacts of the study and uses an internationally accepted, standardized framework for evaluating the impact of the intervention along the dimensions of relevance, coherence, effectiveness, efficiency, impact, and sustainability.

Further, it enumerates the key barriers and challenges identified during the study and builds on the in-depth analysis of both the quantitative and qualitative findings obtained through the impact assessment study to provide meaningful insights into the effectiveness of the E-learning program and identify areas where it can be further improved for its continued growth and success. The key aspects of the program that have contributed to its success and the challenges that need to be addressed will be delved into, with the aim of providing valuable recommendations for stakeholders to consider. The objective is to assist the program in evolving and adapting to the changing needs of students, teachers, and the broader education system.

> As a parent, I am glad that my child is receiving a modern education that utilizes digital devices. I have noticed that my child and other students in the program have become more motivated toward learning, and their intelligence quotient has also improved. Additionally, I believe that when children in a community receive education, the entire community becomes empowered.
>
> **-Hitendra Kumar Thakor, Father of Parth Thakor studying in 5th Grade Achrasan Prathamik Shala**

7.1 Key Impacts

LEARNERS

Enhanced Learning Outcomes

Increased Proficiency with Digital Tools

SCHOOL ECOSYSTEM

Teacher Professional Development

Increased use of Digital Tools

Student-centric Instructional Processes

COMMUNITY

Increased Awareness about Importance of Digital Tools

Increased Buy-in from Parent Community

IMPACT OF E-LEARNING PROGRAM

"As a mother, I am truly grateful for the e-learning program that my child has been a part of. This program has brought a remarkable change in my child's academic performance and has also been influential in bringing about a positive change in the community.

The sLearn technology has been instrumental in enhancing my child's learning experience, making it more engaging, and motivating for them. They have been able to explore a range of interactive learning tools that have made learning more exciting and challenging.

-Chetna Bhagat, Mother, Bawalchudi village, Chaapi cluster, Banaskantha district"

7.2 Key Challenges

Some of the key challenges identified in the implementation of the E-learning program through qualitative interviews with the key stakeholders and FGDs with students are enumerated below:

Technical Challenges:

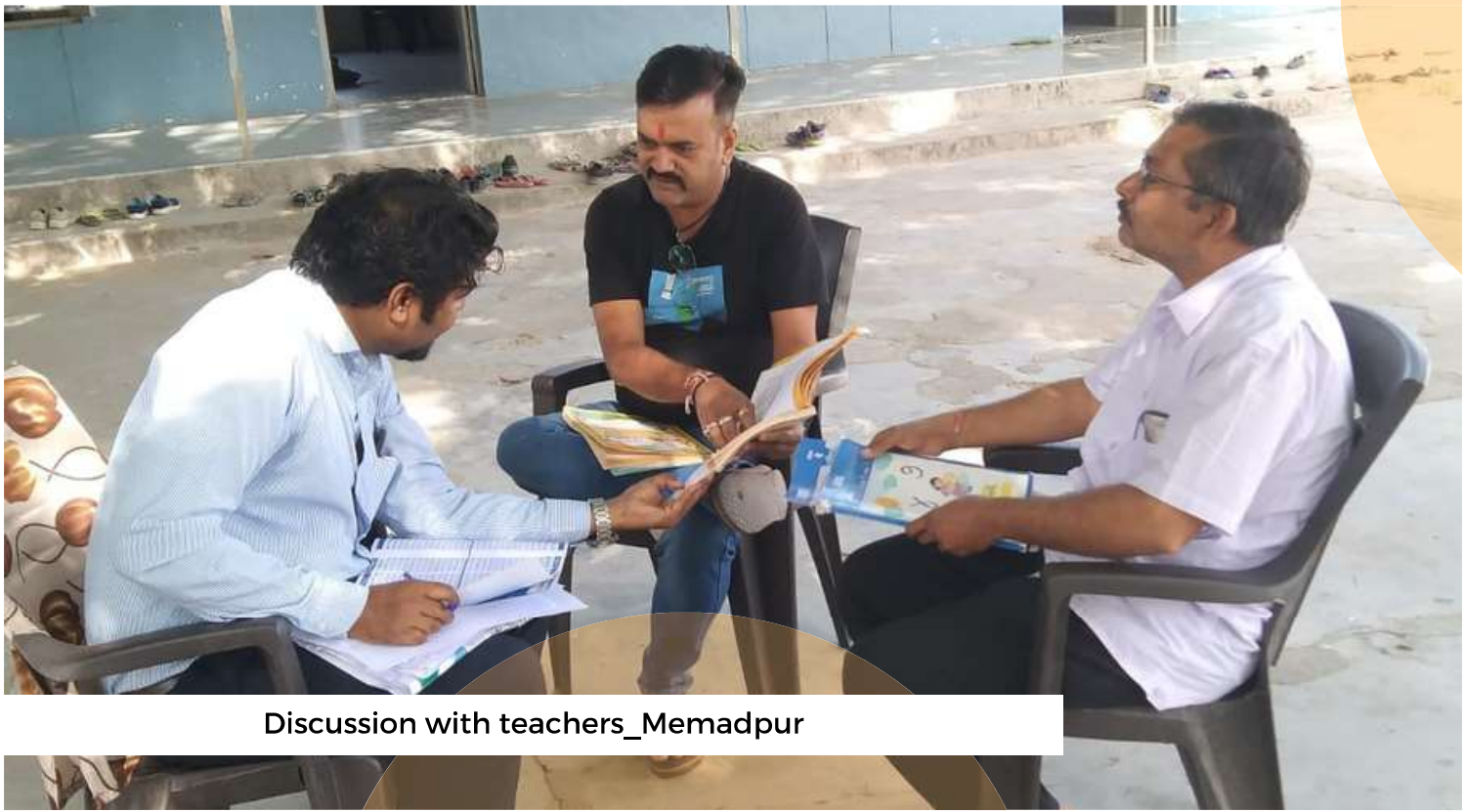
The program faced a few technical challenges related to logging into the app and internet bandwidth. These challenges impacted the smooth execution of the program to a certain extent and required timely interventions to ensure its effectiveness.

Continuity of Learning:

Ensuring the continuity of learning was another challenge faced by the program. Teachers and students noted that the learning app was not available on Play Store, which made it difficult to access the program from home. The program's team must address this issue to maintain the continuity of learning and maximize its impact.

Teacher Handbooks:

The program did not provide a hard copy of the skilled-based content of the sLearn program to teachers. This posed difficulties for the teachers in understanding and building their own understanding of the underlying pedagogy and adapting their teaching accordingly.



Discussion with teachers_Memadpur

OECD FRAMEWORK FOR EVALUATION

The OECD Framework for Evaluation is a widely recognized and established framework that provides a normative approach to assess the effectiveness of developmental programs. The framework consists of six criteria, namely relevance, coherence, effectiveness, efficiency, impact, and sustainability, which together provide a holistic view of the program's performance.

The relevance criterion evaluates whether the program objectives are aligned with the needs and priorities of the target population, while coherence assesses the consistency of the program with broader policies and strategies. Effectiveness examines the extent to which the program has achieved its intended results, and efficiency looks at how well the program has utilized its resources to achieve those results.

Impact evaluates the wider social, economic, and environmental effects of the program, and sustainability assesses whether the program can be sustained over the long term. Additionally, replicability and scalability are also important sub-indicators to consider, as they assess the potential for the program to be successfully implemented in other contexts and to reach a larger population.

Overall, the OECD framework provides a comprehensive and structured approach to evaluating developmental programs, ensuring that programs are effective, efficient, and sustainable and that they make a positive impact on the target population.

RELEVANCE

The E-learning program is highly relevant because it focuses on transforming the teaching-learning processes by equipping the teachers with state-of-the-art digital tools to implement a learner-centric pedagogy. Since learning achievement hinges on the quality of teaching, it fulfills a serious need to maximize learning in an environment where teaching is largely teacher-centric. Additionally, the program is improving the learning outcomes of public-school students and enabling them to meet the challenges of a world that is becoming increasingly digital and thereby working towards providing equitable access to IT resources, knowledge, and skills. The pandemic exposed large inequalities in access to technology and digital tools, however, the intervention allowed the students to continue their education with the most effective modality, that is, online learning.

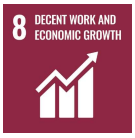
COHERENCE

The E-learning program aligns well with the following Sustainable Development Goals:

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all and the national thrust on quality of teaching for systemic reform as reflected in the NEP 2020.
SDG 4, Target 4.4 aims to substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.
SDG 4, Indicator 4.4.1 tries to quantify the proportion of youth/adults with information and communications technology (ICT) skills, by type of skill.

Index : 5 points – Very high; 4 points – High; 3 points – Moderate; 2 points – Low; 1 point – Very low

SDG 8 aims to ensure promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all as language is the basis of the skills, communication, and participation through which populations can play an active role in socioeconomic development.



SDG 10 aims to reduce inequalities by leveraging inclusive and effective learning pedagogies, richly resourced learning environments, and relevant and measurable knowledge and skills for digital literacy, digital learning, life skills, and employability.

Furthermore, the project aligns well with the following policies and goals at the national level:
National Policy on Education (NEP) 2020 envisages that every classroom will be developed into a smart classroom in a phased manner, using digital pedagogy and thereby enriching the teaching-learning process, with online resources and collaborations.

NEP 2020 highlights emphasize the criticality of improving the quality of teaching for systemic reform in education.

Digital India envisions the transformation of the nation into a digitally empowered society and a knowledge economy by promoting universal digital literacy.

EFFECTIVENESS

The program has demonstrated success in achieving its main objectives, which are centered around utilizing digital technology to implement teaching and learning methods that prioritize the needs of students, resulting in improved learning outcomes. This is corroborated by quantitative data gathered from student assessments that indicate that they have exceeded state averages in both Gujarati language and mathematics, as determined by the National Achievement Survey. Additionally, qualitative data indicate a noticeable change in the beliefs and practices of teachers, with some schools adopting a blended teaching approach that incorporates technology into their classrooms. Thus, it is high on effectiveness.

EFFICIENCY

The E-learning program used digital technology efficiently to reduce manual labor, resulting in an effective time-bound delivery and monitoring and evaluation system. The software leveraged was developed by a specialized agency to ensure efficient technology delivery. The program also provided extensive teacher training to seamlessly integrate digital tools into their teaching methodologies, leading to increased confidence and motivation. All materials were in a digital format, saving costs and positively impacting the environment. Further, the monitoring and evaluation system allowed for real-time tracking of student progress and timely interventions, leading to better learning outcomes. Overall, the program has efficiently utilized resources and achieved its goals of enhancing learning outcomes and creating a digitally empowered society.

Index : 5 points – Very high; 4 points – High; 3 points – Moderate; 2 points – Low; 1 point – Very low

IMPACT

The impact of the E-learning program extends beyond the immediate benefits of improved learning outcomes and student-centered teaching and learning processes. The program has equipped both teachers and students with essential digital skills and familiarity with digital tools, which will be valuable in securing high-paying jobs in the future, placing them on equal footing with their more privileged peers.

Access to a vast pool of digital knowledge has also enhanced the students' self-confidence and provided them with a wealth of learning opportunities that would have otherwise been inaccessible. Additionally, the program has sensitized parents to the crucial role that digital tools play in enhancing their children's learning, paving the way for a more informed and supportive parent community.

SUSTAINABILITY

The sustainability of the E-learning program can be attributed to the various systems and processes it has instituted. Firstly, the program has provided extensive capacity-building opportunities to teachers and students in the use of digital tools. This has not only equipped them with the necessary skills but has also instilled a sense of confidence and motivation to continue utilizing technology in their teaching and learning processes.

Moreover, the program has led to a change in mindset among teachers, students, and parents regarding the acceptance and appreciation of digital tools in education. This shift in mindset is likely to sustain the program in the long run as it has created a culture of utilizing digital technology to enhance learning outcomes. The fact that the program was implemented in public schools is also a significant contributor to its sustainability. By being implemented in the public delivery system, the program has influenced key stakeholders in the system, including policymakers and administrators. This influence makes it more likely for the program to be adopted and scaled up by the public education system, ensuring its sustainability.

Index : 5 points – Very high; 4 points – High; 3 points – Moderate; 2 points – Low; 1 point – Very low

CONCLUSION AND RECOMMENDATIONS

The E-learning program has had a significant positive impact on the school ecosystem, improving the academic performance and interest of the students, increasing their proficiency in digital learning tools, and enhancing the professional development of teachers. The success of the program is evident from the seamless transition of intervention schools to online learning and the sustained better performance compared to the state average. Furthermore, the program has contributed to reducing inequalities by equipping students and teachers with digital skills and narrowing the gap with their privileged counterparts.

However, to maximize its impact, the program needs to address the challenges and barriers that emerged during the study. Additionally, to ensure its scalability and replicability, the program needs to adapt its design to keep up with the ever-changing educational landscape. To this end, we recommend the following steps to strengthen the program:

Build a Robust Professional Learning Community (PLC)

- Create a platform for teachers to connect, share their experiences, and receive support from each other and the program's team.
- Conduct regular training and development sessions to keep teachers updated on the latest pedagogical methods and technological advancements.
- Provide hard copies of the skilled-based content of the sLearn program to teachers to help them understand the program's underlying pedagogy better.

Expand Outreach

- Increase program visibility by using social media platforms, local newspapers, and community radio stations to reach out to parents, teachers, and students in remote areas.
- Partner with local NGOs and community-based organizations to expand outreach and ensure the program reaches marginalized and vulnerable communities.
- Fine-tune the program model and include a larger number of schools to maximize the impact.

RAJIB NATH

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