

SANDBOX SPRINT REVIEW

EdTech Interventions for Deaf Learners' Sandbox

Sprint 1 Review

Date December 2020

Authors Maira Siddiqui
Asad Rahman
Sarah Shaikh
Richard Geary
Aaron Awasen
Daniel Plaut

DOI 10.53832/edtechhub.0130



UKaid
from the British people



THE WORLD BANK



unicef
for every child

About this document

Recommended citation	Rahman, A., Siddiqui, M., Shaikh, S., Geary, R., Awasen, A., & Plaut, D. (2020). <i>EdTech Interventions for Deaf Learners in Pakistan: Sprint 1 Review</i> . [Sandbox Sprint Review]. EdTech Hub. https://doi.org/10.53832/edtechhub.0130 . Available at https://docs.edtechhub.org/lib/CYESNSWU . Available under Creative Commons Attribution 4.0 International
Licence	Creative Commons Attribution 4.0 International https://creativecommons.org/licenses/by/4.0/ You — dear readers — are free to share (copy and redistribute the material in any medium or format) and adapt (remix, transform, and build upon the material) for any purpose, even commercially. You must give appropriate credit, provide a link to the licence, and indicate if changes were made. You may do so in any reasonable manner but not in any way that suggests the licensor endorses you or your use.
Notes	EdTech Hub is supported by UK aid (Foreign, Commonwealth and Development Office), Bill & Melinda Gates Foundation, World Bank, and UNICEF. The views expressed in this document do not necessarily reflect the views of UK aid (Foreign, Commonwealth and Development Office), Bill & Melinda Gates Foundation, World Bank, and UNICEF.
Reviewers	Tom Kaye

About EdTech Hub sandboxes and sprint reviews

A sandbox fast-tracks promising EdTech interventions by providing funding, tools, and access to evidence. It provides a space for partners to test and grow ideas in conditions of uncertainty. We break sandboxes up into short sprints, learning and iterating as we go. Each sprint informs changes and new ideas for the next.

Sprint Reviews and Overview Reports allow for sandbox partners to share their insights by capturing what was tested, what was learned, and how it might inform their intervention moving forward. In doing so, these documents also serve as case studies for the broader EdTech community. For more information, please visit <https://edtechhub.org/innovation/>.

Contents

Summary of Sprint 1	4
What did we do?	4
What did we learn?	4
How does this affect what we do next?	5
1. Introduction	6
1.1. Deaf Reach Sandbox: Sprint 1	6
1.2. Research questions guiding Sprint 1	7
1.3. Sprint 1: Minimum proofs	7
2. Survey method	8
2.1. Materials	8
3. Sprint 1: Findings	9
3.1. Academic progress	9
3.2. Learner engagement	11
3.3. Uploaded digital content	13
3.4. Device usability and efficacy	13
3.5. Condition of laptops	14
3.6. Caregiver engagement	15
3.7. Caregiver capacity	15
4. Test and survey materials	17
5. What did we learn?	19
5.1. The positives	19
5.2. The negatives	20
5.3. How does this affect what we do next?	20

Summary of Sprint 1

What did we do?

We provided low-cost, offline laptops to 225 deaf learners across various locations in Pakistan, uploaded with 56 short video stories in [Pakistan Sign Language](#).¹ Over one month (September–October 2020), we wanted to test if the laptops would remain safe (without loss or damage and that children would be able to adapt to digital / distance / non-facilitated learning (engage with and study content regularly). Our minimum proofs (metrics by which we would know our test was a success) were:

- At least 90% of laptops distributed are functional. Children reported using the laptops at least 4 days a week.
- Learners will retain at least 70% of their learning while out of school.

What did we learn?

To get data, we carried out surveys, interviews, and short, written pre- and post-tests (see [Section 2](#) for more information, with insights on data collection under [Section 4](#)). [Section 5](#) provides a summary of learning. Topline figures indicated:

- Children showed significant learning gains, with a baseline 68% improvement in scores (see [Section 3.1](#)).
- Most learners engaged 4 days a week, although more with the digital stories than the worksheets (see [Section 3.2](#)).
- Ninety-five per cent of laptops were returned undamaged and in the same condition as they were received after one month, and 85% of users self-reported finding the content easy to navigate (see [Section 3.4](#)).
- Eighty-seven per cent of caregivers supported their child (see [Section 3.5](#))

¹ See <https://www.psl.org.pk/home> Retrieved 13 November 2022

How does this affect what we do next?

Sprint 1 indicated that laptops could be used without being damaged and that children would adapt and engage with content at home. In Sprint 2 we will (see [Section 5.3](#)):

- Provide more content for children to engage with. Subjects include: English, mathematics, science, and Urdu.
- Introduce connectivity to enable the children and caregivers to engage with teachers twice a week, to test whether this increases caregiver capacity and child engagement.

1. Introduction

Deaf Reach, a programme of the Family Educational Services Foundation, runs seven schools across Sindh and Punjab in Pakistan, with a focus on academic and vocational learning. The curriculum is catered to the needs of the Deaf and is delivered in Pakistan Sign Language. Deaf Reach's holistic approach equips deaf learners with marketable skills they can use for future employment and career building.

With the Covid-19 pandemic impacting everyday life and schools being closed indefinitely, Deaf Reach has been working to meet the new challenges. As we acclimatise to these unprecedented conditions, we are determined to continue serving the Deaf community to the best of our ability in providing information, access, and education. To accomplish this, we have implemented a distance learning programme. To make sure that this programme enables deaf children to retain (or even grow) learning in core subjects and improve their health and well-being, we are testing various approaches in a sandbox with EdTech Hub. Our key question is: *What EdTech interventions are most suitable for providing distance learning for deaf children?*

Our goal is to grow an approach that is proven to work through real-world testing.

1.1. Deaf Reach Sandbox: Sprint 1

As part of the first sprint with the EdTech Hub Sandbox, a one-month experiment was conducted among primary-level learners at Deaf Reach Schools, Colleges, and Training Centres. Learners received low-cost laptops loaded with 56 stories in Pakistan Sign Language. These stories were supplemented by worksheets and activities to help learners review their lessons and to gauge their academic progress. Each signed video was accompanied by a voice-over in Urdu and English so hearing members of the family could also benefit from these resources.

An in-person orientation session was held in August 2020, where caregivers and learners visited the school. During the session, caregivers and learners were given lesson plans and weekly timetables to assist them in scheduling study time at home. The teachers also gave detailed tutorials on the usability and navigation of the laptop device as well as on the safety and security of these devices.

A pretest was also conducted with the learners to create a baseline and measure learner progress at the end of the pilot run.

The findings outlined below highlight the challenges of learning with EdTech, what worked, and ways to improve and adapt distance learning in a Pakistani setting for deaf learners.

1.2. Research questions guiding Sprint 1

- Does the digital content in Pakistan Sign Language provided on laptops help primary-level learners at Deaf Reach retain their language and learning skills?
- What effect, if any, does watching content in Pakistan Sign Language and reviewing lessons regularly have on learning outcomes among primary-level deaf learners?
- How can Deaf Reach modify device operations and hardware to improve the user experience for deaf learners?

1.3. Sprint 1: Minimum proofs

- At least 90% of laptops distributed are functional.
- Children reported using the laptops at least 4 days a week.
- Learners will accomplish at least 70% of their learning outcomes.

2. Survey method

Table 1. *Demographics: Target sample*

No. of Participants	Grades	Locations
225 deaf learners	Grades 3, 4, and 5	Karachi, Hyderabad, Rashidabad, Nawabshah, Sukkur, and Lahore

A total of 225 learners from Grades 3, 4, and 5 received low-cost laptop devices across Sindh and Punjab provinces in Pakistan.

2.1. Materials

Table 2. *Research tools used for data collection*

Tools Used		
Written pre- and post-test	Feedback Survey Form	Interview

The tools used gathered information on academic progress, learner and caregiver engagement, device efficacy, and overall experience of at-home learning.

Each test item was designed to be objective and was marked as either correct or incorrect. The written test consisted of five questions. It was particularly important for us to create a concise and simple test based on the academic level and language abilities of our learners.

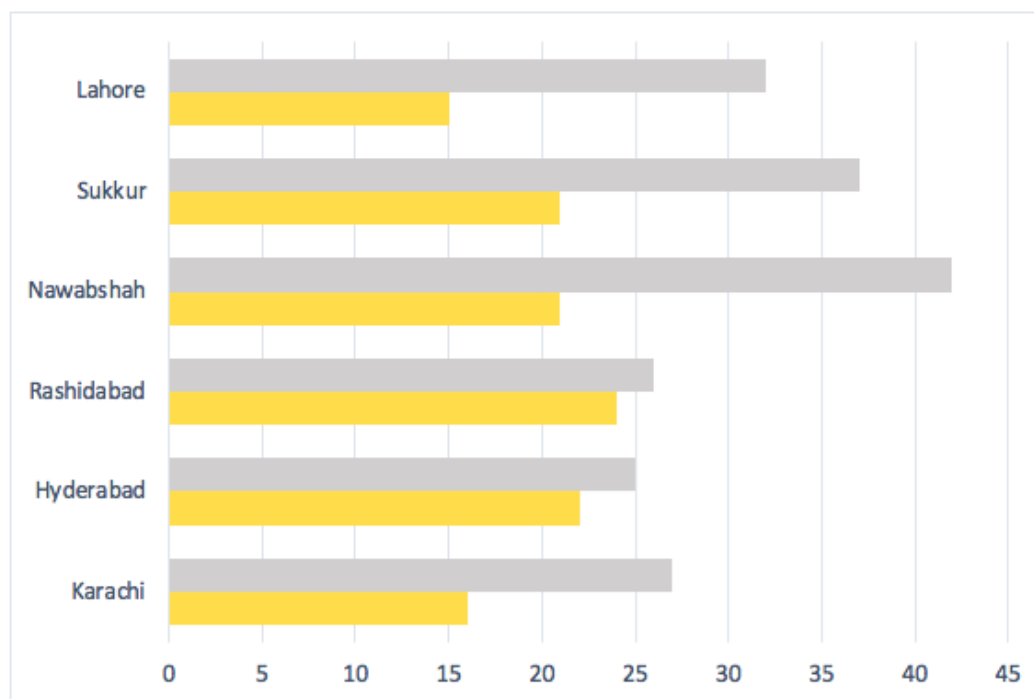
The feedback form, a 20-item questionnaire, helped us gather much-needed information on learner engagement with digital content and laptop devices. Each questionnaire included a range of qualitative and quantitative questions to best record learner experience.

A short interview was also conducted with caregivers and learners to supplement the findings from the feedback form.

3. Sprint 1: Findings

3.1. Academic progress

Figure 1. Average score by location

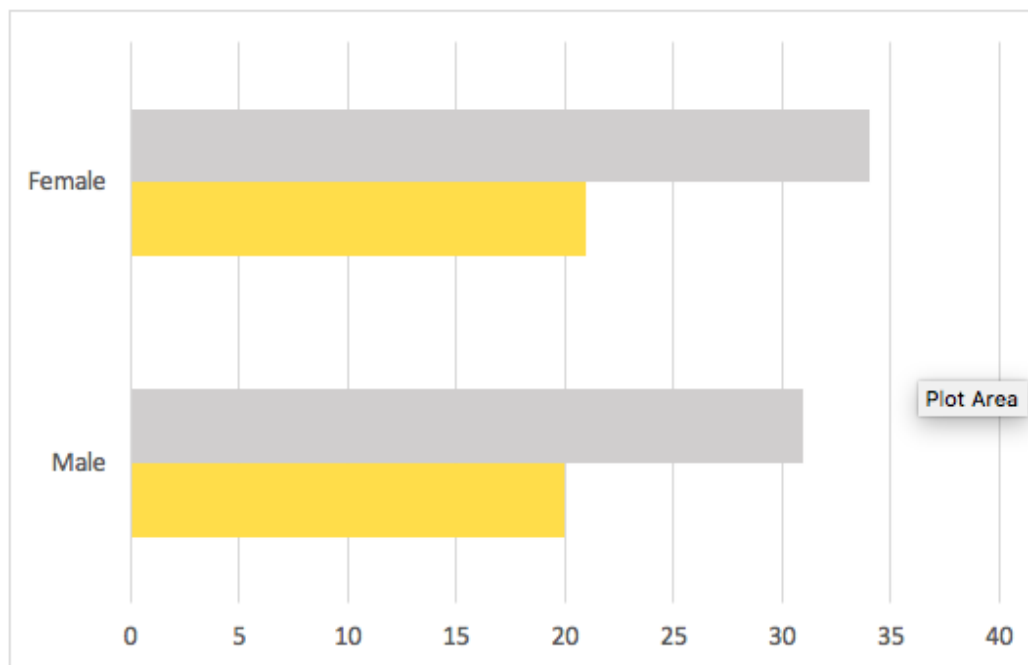


Post-test	Pretest
-----------	---------

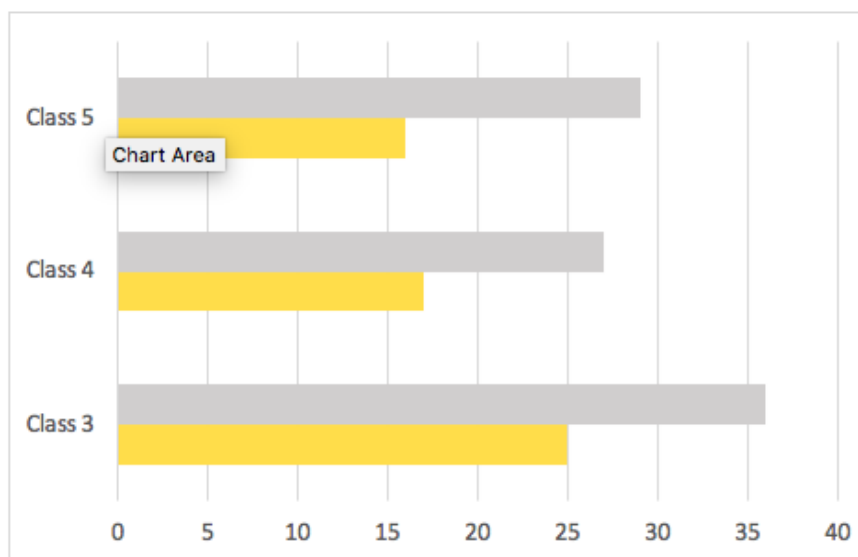
- The pretest and post-test comparison shows a significant improvement in average test scores across all locations.
- The baseline score, determined prior to the intervention, averages at 19. While endline scores average at 32 showing a 68% increase in average scores.
- Nawabshah (31) and Lahore (13) showed the highest level of change in average scores at an improvement rate of 100% and 113%, respectively.
- Hyderabad (36) and Rashidabad (25) show the lowest rate of improvement at 14% and 8%, respectively.
- The survey data shows that 39% and 35% of learners from Hyderabad and Rashidabad, respectively, only studied and viewed the content

twice a week or less. This likely contributed to lower improvement rates between the two campuses and highlights the need for continuous learner engagement.

Figure 2. Average score by gender



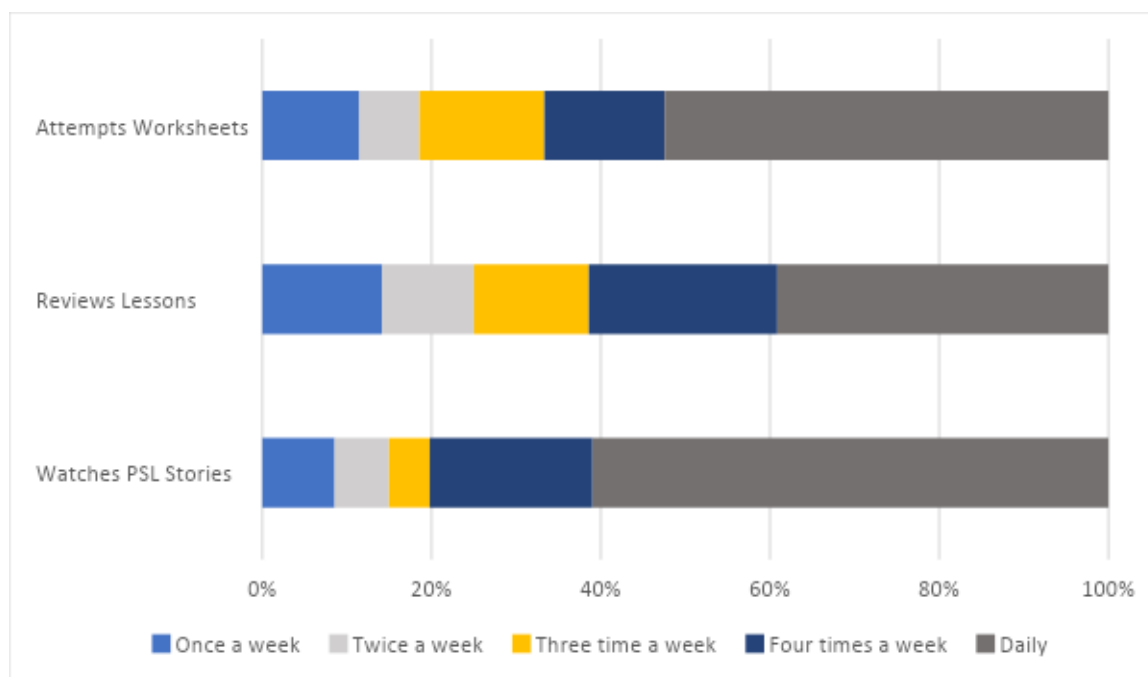
- Overall, male and female deaf learners showed improvements in academic performance post-intervention with an average *increase of 59%* among the two.
- Female learners showed a higher rate of improvement at 62%, while male learners improved academic performance by 55%
- Our survey highlights that male learners are prone to going outside and playing with their friends and generally display a lack of interest in at-home learning. This likely contributed to a lower rate of academic progress in male learners.

Figure 3. Average score by grade level

- All grades showcased a significant improvement in their learning with an average *increase of 61%*.
- Of those tested, Grade 5 showed the highest positive increase in average scores at 81%, and Grade 3 showed the lowest at 44%.
- The average score for Grade 3 stood at 25 out of 50 in the pretest, resulting in a lower rate of increase even though the post-test score was the highest at 36.

3.2. Learner engagement

It is hard to determine the level of learner engagement based on an academic test alone. A feedback form was a useful way for us to fill in such gaps in information and include it in our analysis.

Figure 4. *Frequency of content engagement*

As displayed above, most respondents accessed our content at least four times a day or more. Over one hundred of these respondents (61%) watched stories in Pakistan Sign Language (PSL) and attempted worksheets on a daily basis, showing that most learners used the devices to study and view stories in Pakistan Sign Language.

Timetables and lesson plans were followed overall, and weekly worksheets were reportedly attempted at least once a week by all respondents. Of these, over 60% understood the teaching instructions laid out for them.

However, teachers reported close to 25% of worksheets to be incomplete or entirely blank. When probed, learners and caregivers said the activities were too difficult to understand and / or there were too many to complete in the allotted time.

The 'short questions activity' proved to be the most difficult for learners to understand and attempt, with about 55% of learners struggling to complete the task. These learners reported that they found it difficult to search for answers within the stories and structure sentences.

A lack of interest in learning was also observed in some learners, particularly as the distance learning programme entered its final stage. About 30 learners (13%) were observed to have stopped following the weekly timetable, begun studying on their own time, and opted for

playtime over studies. These learners recorded studying once or twice a week at an average of one hour per day in the last week of Sprint 1.

With most Deaf Reach households belonging to low-income families, 19% of our total sample do not have a separate space in the house to study. Many learners have 7–8 family members who share one living space where they have to eat, sleep, and study.

3.3. Uploaded digital content

Among the 56 stories distributed via laptop, we had some clear winners among our learners. The top 4 rated stories were: 188 Bahadurabad – Nunno’s Home, A day with Saima, Discovering Pakistan, and the ‘Quaid se Baatein’ series.

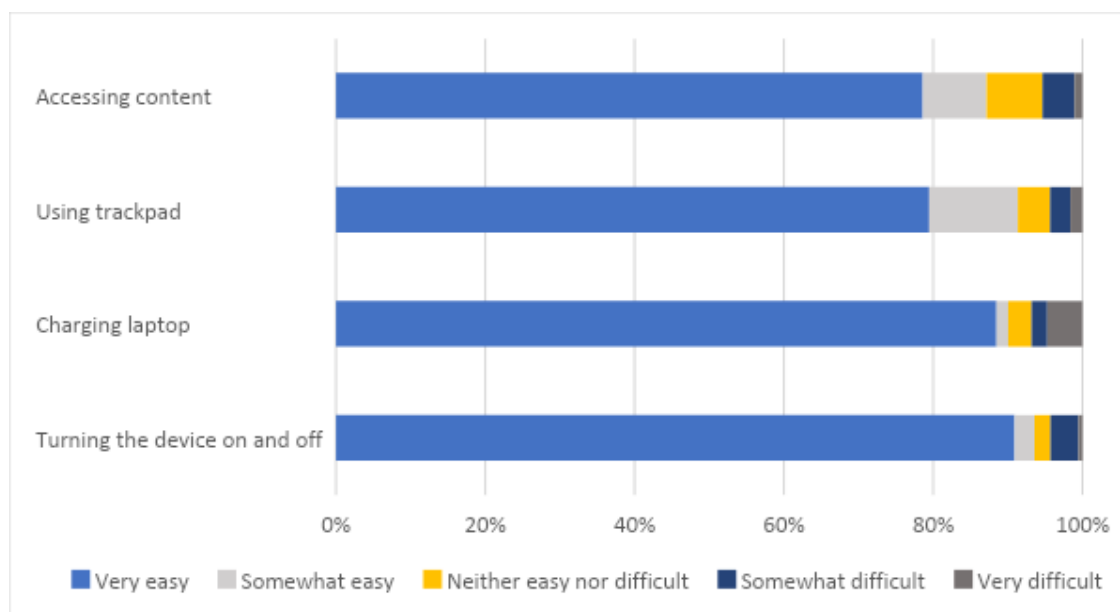
These stories were some of the favourites due to their:

- Strong moral lesson
- Good animation
- Characters
- Story setting

The findings show that learners were familiar with the uploaded content, knew the characters and themes and had well-defined reasons for choosing their favourite.

3.4. Device usability and efficacy

In order to understand user experience, it was essential for us to gather valuable feedback on the laptop devices. This will ultimately help us address device issues and consequently modify them.

Figure 5. User feedback on laptop devices

As shown above, over 85% of caregivers and learners found it easy to navigate and access content on the device. Already familiar with other electronics, learners found it easier to acclimatise to the laptops. Further probing also revealed that the orientation session at the school helped participants familiarise themselves with the laptop devices and use them.

The problems highlighted below can help guide further improvements:

- Laptop device: The screen would occasionally freeze. In a few cases, the laptops had to be restarted to work properly.
- Charging issues: Rapid drops in battery power were reported, which was especially troubling for those with electricity issues.
- Loss of access: Accidental set-up of login passwords prevented learners from logging back in.
- Laptop size: A few learners reported that the small screen size and low resolution meant they did not fully capture information in the stories.

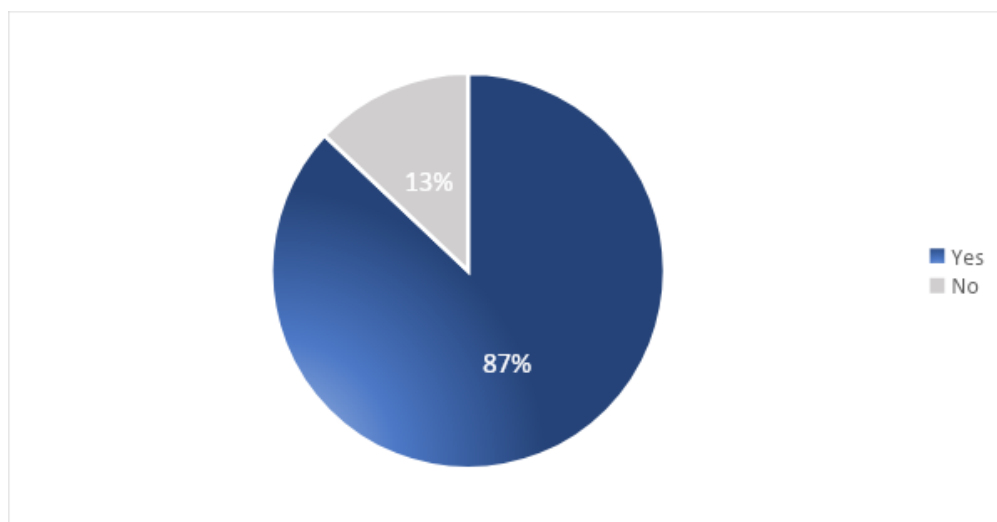
3.5. Condition of laptops

All learners participating in the pilot were asked to bring in their laptop devices to check for any repairs needed. Teachers used a device repair

checklist to examine possible hardware or software issues. The data gathered shows that over 95% of laptops were returned in the same condition as at issue. However, damaged laptops were replaced or repaired whenever the school was informed of any damage.

3.6. Caregiver engagement

Figure 6. *Percentage of caregivers assisting in learning*



Of those surveyed and interviewed, 87% of caregivers assisted their children in the retention of their learning and language skills.

The assisted learners received guidance in a variety of ways, here are some of the most popular:

- Talked to children about their lesson (18%)
- Asked how the children feel (15%)
- Encouraged communication through sign language (15%)
- Helped children plan a story and activity (13%)
- Helped children understand schoolwork (14%)

3.7. Caregiver capacity

While it is difficult to gauge the quality of assistance being given, it should be noted that only 47% of caregivers are 'definitely capable' of helping their

children at home. According to the caregivers, they are most comfortable in assisting with the following tasks:

- Helping the child identify words in the story.
- Helping the child with worksheets.

Caregivers reported facing difficulty keeping track of lesson plans and signing stories with their children. The most common reasons cited were:

- Unable to read or write (25%)
- Employed full time (17%)
- Unable to communicate in sign language (19%).

4. Test and survey materials

Table 3. *Observations on the data collection tools*

Tools Review		
Test	Feedback Form	Interview
<p>The objective questions allowed us to collect accurate quantitative data, giving a more reliable and valid result that can easily be compared to check academic progress.</p>	<p>The quantitative questions tested more positively with our participants than qualitative questions.</p> <p>Data shows that feedback from recipients was that they were more likely to attempt simpler quantitative questions than qualitative ones.</p>	<p>Some respondents were more willing to share information verbally due to a lack of reading and writing skills.</p>
<p>The short and concise structure was important in getting the most relevant data. Future tests will have no more than four sections so as not to fatigue the test taker and skew the results.</p>	<p>Most responses to open-ended questions were either left blank, had one-word answers, or were irrelevant to the question being asked.</p>	<p>Need to train interviewers on best practices as interviews are often stiff and lack in-depth information that can easily be gathered with this approach.</p>
	<p>Reverse rating / ranking in quantitative questions allowed us to gauge the accuracy of the responses and participants' level of understanding.</p> <p>For example, few respondents gave a</p>	<p>The interview needs to flow like a conversation rather than feel like a one-sided interview.</p> <p>More probes and continuous questions will build flow and help get the best responses.</p>

	<p>rating of 1 to the device even though they reported no issues.</p> <p>This is likely due to a reverse positive ranking in the previous question, where 1 = very easy. This suggests the respondent either did not understand the question or was not paying attention to the form.</p> <p>These reverse positives affected the quality of the review process.</p>	
	<p>Despite the lack of responses, the qualitative questions allowed us to gather more in-depth and rich data. The responses supplemented quantitative data and allowed us to see emerging behavioural patterns.</p>	<p>Interviews with caregivers and learners presented both qualitative and quantitative questions in order to understand engagement, usability, and use of content and laptops.</p>

5. What did we learn?

Before we dive into the details of our findings, it is a good idea to consider what worked.

Despite minor hiccups, the distance learning programme has been proven to help retention of learning, improve learning outcomes, and maintain learner attention during remote learning. Although implementation and data collection took place over one month, we were able to get a broad and very usable range of insights to inform our next sprint.

5.1. The positives

- An increase of 68% in average scores proved that the distribution of laptop devices loaded with content in Pakistan Sign Language helped primary-level learners to retain language and learning skills.
- Male and female deaf learners showed higher improvements after the intervention with a 62% and 55% increase in average scores, respectively. This improvement in learning outcomes and academic progress is also reflected in the data related to grade level and location.
- Over 75% of the learners watched stories in Pakistan Sign Language and attempted worksheets at least four times a week. These learners followed the timetable allotted by the school and studied for an average of 3–4 hours a day.
- Regular engagement with content resulted in increased lesson retention, as demonstrated by an awareness of story titles and plots. Those studying regularly were quick to identify their favourite story, describe the plot, and name their favourite character.
- The laptop devices rated well with our participants. As per the survey, they were seen as user-friendly and easy to navigate. A one-day orientation detailing the processes and procedures of the device was sufficient to learn how to operate the devices.
- Of the distributed laptops, 95% remained undamaged and were returned in the same condition as before distribution. The remaining devices suffered minor casing cracks and scratches that will not hinder usability.

- More than 85% of caregivers helped their children with schoolwork. These caregivers spent a considerable amount of time discussing lessons, communicating in sign language, and planning stories and activities.

5.2. The negatives

- Of the submitted worksheets, 25% were incomplete or entirely blank. Learners were unable to attempt these due to a lack of understanding and a lack of available help at home.
- The 'short questions activity' was the most challenging for learners. It was difficult for them to find answers from the story and write with proper sentence structure.
- Data patterns also show a growing lack of interest in at-home learning towards the end of Sprint 1. Some learners, mostly male, found remote learning tedious and avoided study time altogether, which is easier to do at home than in school.
- The most commonly reported laptop issues were screen freezing, low volume, low battery, and issues with logins.
- While caregivers offered assistance at home, it was difficult to check the quality of help being provided.
- Many of the caregivers did not have the capacity to provide the academic or technical help needed by learners at home.

5.3. How does this affect what we do next?

Based on the findings above, we will implement and test the following approaches in Sprint 2:

- Create an online bi-weekly check-in plan to ensure learners are on track with their learning and to understand challenges to content accessibility and engagement better
- Through weekly check-ins, provide caregivers with more guidance on how they can assist their children at home.
- Incorporate regular teacher feedback to check assignments and worksheets in order to track learner academic progress and intervene if deemed necessary.

As part of Sprint 2, Deaf Reach will explore and examine the possible reasons behind the variances in performance by region and gender. We will also look at which practices can be replicated and adopted from high-performing regions.

These experiments will ultimately help us discover the best approaches to using EdTech and the most suitable interventions, particularly for deaf learners.