



Laughter,  
Learning  
& Technology

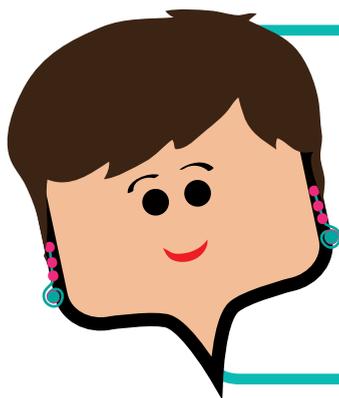
An initiative by



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"The **Play 'n' Learn** initiative harnesses the power and popularity of the *Galli Galli Sim Sim* brand to help us build a body of evidence to support the fact that game-based learning using smartphones and tablets can lead to improved gains in reading and numeracy – both essential skills for young children to make them lifelong learners."

*Sashwati Banerjee*  
*Managing Director, Sesame Workshop in India*



**Laughter,  
Learning  
& Technology**

Exploring digital learning for children in  
classrooms and communities

An initiative by



Supported by





## INTRODUCTION

**Play 'n' Learn**, an innovative collaborative experiment in introducing technology to a hitherto unexposed grade-school population, produced promising results. Children proved highly accepting, interested, and capable.

More important, despite its short-term nature, the project provided valuable lessons for taking the experiment forward and improving future results.

*“I think that since the world is progressing, new things are coming, so it is good to adopt it. I feel good that kids are learning.”*

Class 3 teacher, Arya Pathshala

# BACKGROUND

**Sesame Workshop in India** (SWI) debuted *Galli Galli Sim Sim* (GGSS) on TV in 2006. The show has been watched by over 100 million<sup>1</sup> kids since its debut in 2006, and its educational messages have been extended through community radio stations, extensive community outreach, and applications on new and emerging media. GGSS, like its local Sesame Street counterparts all over the globe, uses the power of the media to help kids grow smarter, stronger and kinder and succeed in school and life. We develop and distribute high quality and engaging content to children aged 0-8 years through television, radio, community radio, print, and digital outreach. Our content is geared towards developing young Indian kids' basic academic and life skills, while celebrating India's rich cultural diversity, in order to promote their overall cognitive, socio-emotional and physical development.

Since 2011, **Qualcomm's Wireless Reach initiative** has supported SWI's work to explore the impact of digital technology on children's learning outcomes. The **Play 'n' Learn project** aimed to expose grade-school children to quality literacy and numeracy educational content on smartphones and tablets.

During Phase I, **Play 'n' Learn** was initiated as an experiment in a community setting in Delhi, and then moved to school settings, in Delhi and Bihar as part of Phase II. The games were also introduced in our other community engagement initiatives, specifically Kolkata.

This report sums up these various phases, and draws conclusions for next steps.



<sup>1</sup> Turner-KPMG Report (2006-11) & TAM (2012-15)

# WHY?

The ASER (Annual Status of Education Report) Centre, which conducts comprehensive surveys in the education landscape, is definitive in saying that 3-16 year olds in rural schools consistently perform below school standards. Challenges include lack of engaging content in classrooms, shortage of teachers, low motivation and poor infrastructure.

With an estimated smartphone penetration of 13 percent (158 million<sup>2</sup>) as of July 2014, mobile technology provides a significant opportunity to address this learning deficit. SWI and Qualcomm recognized the unique role their partnership could play in this situation. With our combination of creative skills, market reach, and cutting-edge technology, we set out to both learn and teach.



*“Yes. They talk more about what they learn on the games. For instance, they watch space shows on TV and link it to Grover Ki Antariksh Yatra.”*

**Class 3 teacher, Arya Pathshala**



# WHAT?

We set out to investigate:

1. The usefulness of *Galli Galli Sim Sim* games developed for mobile phones and tablets
2. The benefits and limitations of 3G-enabled devices as a new educational content delivery platform
3. The role of technology and software through games designed to serve as moderators of educational activities to increase the social, interactive, creative, and personable value of educational material in areas ranging from child development, STEM (Science, Technology, Engineering, Math), hygiene and sanitation to language and math, as a way to supplement learning and improve educational outcomes



## Snapshot of our digital games and expected learning outcomes



### Grover Ki Antariksha Yatra (Grover's Journey Into Space) - 1 and 2

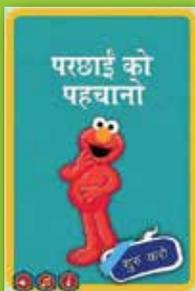
Help Grover travel to the moon and undertake various space-themed challenges.

The child (class 1) will-

- Identify basic 2D shapes
- Know number value (1 to 20)
- Know 'before and after' numbers
- Add and subtract (1 to 20)
- Identify missing numbers

The child (class 2) will-

- Complete patterns
- Recreate simple designs
- Recognize numerals (1 to 50)
- Add and subtract (1 to 50)



### Parchai Ko Pehchano (Identify the Shadows)

Help Elmo identify the shadows of 3D shapes.

The child will-

- Identify shapes with their shadows
- Learn to solve simple problems



### Aakaron Ki Duniya (World of Shapes)

Help Googly reach his friend's house by making a path using 2D shapes.

The child will-

- Identify basic 2D shapes



### Sabse Alag (Identify the Odd One Out)

Help Boombah identify the odd one out.

The child will-

- Build vocabulary
- Classify words and objects



### Kavita Banao (Make a Rhyme)

Help Elmo complete riddles by matching rhyming words.

The child will-

- Make rhyming words
- Learn to solve simple riddles



### Shabdun Ka Khazana (Word Treasure Hunt) - 1 and 2

Help Elmo visit different islands and solve a different challenge at each one.

The child will-

- Identify letters, beginning sounds, ending sounds
- Make rhyming words
- Learn new words and their meanings



### Chitra Pehchano (Identify the Picture)

Help Chamki match sentences with pictures.

The child will-

- Match pictures with words
- Build vocabulary



### Karo Kitaanu Gaayab (Pop the Germs)

Help Raya and Elmo remove all the germs and make the toilet safe and clean.

The child will -

- Understand that even though germs cannot be seen, they are present everywhere



### Sikke Ki Yatra (Journey of a Coin)

Travel with Boombah through various parts of the country.

The child will -

- Do simple operations: addition, subtraction, multiplication, division
- Complete patterns
- Construct sentences
- Learn to solve problems



### Biscuit Baadshah Car Racing (Cookie Kart Racing)

Help Biscuit Baadshah finish the race by collecting different shapes and letters.

The child will learn to -

- Follow instructions
- Recognize shapes
- Identify colors
- Recognize numbers



### Saabun Kare Saaf (Soap-a-Matic)

Help Raya and Elmo collect soaps to keep their hands clean.

The child will-

- Understand the importance of washing hands with soap after using the toilet
- Identify colors



### Chappal Ki Sair (Slipper's Stroll)

Help Raya find her slippers through a maze full of challenges.

The child will-

- Know the significance of wearing slippers while going to the toilet
- Learn to solve problems



### Pani Ka Chamatkaar (Water In, Germs Out)

Help Raya and Elmo take a mug of water through a maze full of challenges.

The child will-

- Understand the need of pouring water in the toilet after using it
- Learn to solve problems



### Chatpat Chutney (Guacpop)

Help Elmo collect appropriate ingredients to make a tangy tomato chutney.

The child will-

- Understand number concepts 1-5
- Recognize vegetables



### Elmo Bana Engineer (Train Track Engineer)

Help Elmo build a track to pick Grover from the station.

The child will-

- Get familiar with STEM concepts (Science, Technology, Engineering, Math)
- Learn to solve problems



### Oscar Ka Kachra (Oscar's Trash)

Help Oscar throw trash in the bin by applying the right amount of pressure.

The child will-

- Get familiar with STEM concepts (Science, Technology, Engineering, Math)
- Understand that trash should be thrown in a trash can/dustbin



### Jodo Aur Jaano (Puzzle Game)

Join pieces of the puzzle to make a picture.

The child will-

- Learn to solve puzzles
- Understand spatial concepts
- Develop task persistence



### Jaano Pehchaano (Memory Game)

Test your memory by matching identical pictures.

The child will-

- Develop visual memory skills
- Develop task persistence

## Grover the Explorer



### Jungle Ki Safari (Grover the Explorer-Jungle)

Take a walk in the jungle with Grover to look for interesting birds and animals.

The child will-

- Learn to follow instructions
- Recognize different habitats



### Samudra Ki Khoj (Grover the Explorer-Sea)

Go underwater for an adventure with Grover and discover exciting sea creatures.

The child will-

- Learn to follow instructions
- Recognize different habitats



### Daldal Mein Kaun (Grover the Explorer-Swamp)

Walk through the swamp with Grover and find some unique animals and birds!

The child will-

- Learn to follow instructions
- Recognize different habitats



### Khojjo Khet Mein (Grover the Explorer-Farm)

Take a walk at the farm with Grover and look out for hidden farm animals!

The child will-

- Learn to follow instructions
- Recognize different habitats
- Identify animals



# WHO?

The first phase of **Play 'n' Learn** was conducted in a marginalized community in Delhi, and the second phase in government-run primary schools in Delhi and Bihar, and the games were further extended to our other initiatives.

In the first phase we provided Karbonn smartphones to 40 children aged 6-8 years and their families in Delhi with pre-loaded content in the form of packaged games. In this phase, the program reached over 40 families in the Lal Gumbad<sup>3</sup> area of South Delhi. A random selection was done to include families in the program, who are under a certain income with a child aged 6-8 years.

In the second phase, we provided the same set of games on Micromax Funbook tablets to 12 classrooms (class 1, 2 and 3) in four primary schools of South Delhi Municipal Corporation (SDMC) - Arya Pathshala, St. Michael's School in Jangpura and SDMC Schools in Defence Colony and Sevanagar (East). Over 400 students from classes 1, 2 and 3 and 12 teachers took part in the program. Each class was provided with 6-9 tablets with three-four children sharing each tablet.

The in-school program was further extended to 50 government-run primary schools in two districts of Bihar<sup>4</sup>. We introduced the five literacy games in 25 schools in Patna, and 25 schools in Vaishali. Here we reached over 4,000 children from classes 1 and 2 across the two districts. A SWI field team member facilitated the digital sessions in the classrooms via low-end tablets.

Four games were extended to our *Raho Swachh Jiyo Mast* campaign around the themes of going to toilet, washing hands with soap and water, wearing slippers to toilet, and pouring water after toilet use. These games were integrated as activities amongst children across slum communities in Kolkata. The children received points on participating in various activities and workshops. Children would accumulate points to access these leveled games, thus incentivizing them to be active participants in the campaign. While the games were not evaluated, anecdotal evidence feedback has been very encouraging.

<sup>3</sup>Lal Gumbad is a locality in South Delhi – our intervention was in a slum cluster in this area.

<sup>4</sup>Supported by All Children Reading (Phase I), Sesame Workshop in India was implementing the Learn to Read, Read to Learn project in 375 schools in three districts of Bihar. To assess the impact of using supplementary GGSS digital games with the intervention, Qualcomm supported by providing five Hindi literacy games (disseminated via SWI facilitators) in 50 schools of Bihar.



# HOW?

**Qualcomm Wireless Reach initiative** has supported SWI in the development of 25 digital games on the Snapdragon processor.

## **Phase I, Community: May to August 2013**

Since family buy-in was key to the success of the project, we paid careful attention to the preparation and training of caregivers on using the tablets and understanding the games, so they could support their children.

Children in both the treatment and control groups were tested on literacy and numeracy skills before and after the intervention. Policy Innovations provided rigorous research and statistical analysis so that we could learn what worked and what didn't.

Some observations based on monitoring data:

- Overall, boys spent more time on all the games (an average of 22.3 minutes) than girls (an average at 16.2 minutes). If access is differentiated across gender, this is an important social factor to consider in future interventions.
- Both girls and boys spent less time on Math games.

## **Phase II, School: November to February 2014**

This phase was necessarily more formal, given the institutional environment and was conducted in Delhi, and two districts of Bihar. In Delhi, we began with teacher and administration training, before handing over the tablets. Over the four-month intervention period, students worked in peer groups as well as with teachers, and spent regular classroom time engaging with the tablets.

We distributed educational content composed of Math and Hindi games on easily accessible tablets, with a Snapdragon processor, in four South Delhi Municipal Corporation (SDMC) schools. This intervention was provided to children from Class 1, 2 and 3 in South Delhi.



In Bihar during Phase II of the study, the intervention was disseminated by trained SWI field coordinators in two districts. Educational content comprised of Hindi games on tablets with a Snapdragon processor. Tablets were distributed in 50 government schools. This intervention was provided to children in class 1 and 2. The duration of this phase of the study was four months.

Some observations during visits to the two intervention sites (Bihar and Delhi) are listed below:

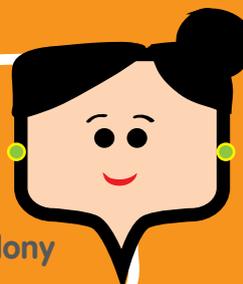
- In both Delhi and Bihar, many children randomly pressed buttons without understanding. However, in most classes, there were one/two children who understood and were able to help others.
- Children were enthusiastic and enjoyed the novelty of the games and tablets in both states.
- Generally, children preferred sharing and playing games together, rather than having a tablet to themselves.
- Class 1 children from both states were very excited about the games, and children from Delhi particularly enjoyed number games.
- Class 2 children enjoyed both literacy and number games, with children from Delhi enjoying shape games a lot.
- Class 3 children from Delhi mastered all the games and read instructions when necessary.

The project reached over 4,500 children in Delhi and Bihar with content on literacy and numeracy. Digital games on sanitation were introduced to additional 50,000 children in Kolkata as part of the *Raho Swachh Jiyo Mast* campaign supported by Bill & Melinda Gates Foundation.

All games are available for download from the Google Play Store and [www.galligallisimsim.com](http://www.galligallisimsim.com).

*“Kids who didn't come earlier now come because of these tablet games”*

Class I teacher, SDMC Defence Colony





# IMPACT

The community study (Delhi)<sup>5</sup> was based on a quasi-experimental study using a control group and pre-test/post-test design, while the school study was carried out using the Non-Equivalent Research Design (NERD). The sample at baseline included 42 children receiving the intervention from a marginalized community in Delhi, and 56 children from a similar community that did not receive the GGSS games. The sample for the school study<sup>6</sup> included four schools as part of the intervention group, and two schools that did not receive the GGSS material. The number of children in the treatment group at baseline was 221, and there were 181 children in the control group.

Two studies<sup>7</sup> were conducted in Bihar to measure the impact of the GGSS intervention using a quasi-experimental study that featured two treatment groups (basic and digital) and a matched control group. In the first study, 148 children from five schools received the digital intervention, and 307 children from 10 schools did not receive the GGSS intervention. The second study was conducted only with children from class 2, with a sample of 64 children in the digital group, and 121 children in the control group.

The findings from the research showed that while teachers and parents acknowledged the benefits of the **Play 'n' Learn** intervention, significant improvements were noted for specific curricular areas. However, we do not consider this discouraging because of several factors:

- The intervention took place over a short period of time, especially in the Delhi community, and it would be unrealistic to suppose that deep change could occur within a few weeks of introducing a new factor in children's lives while keeping everything else constant.
- High attrition in the community study due to migration decreased the sample to 29 children in the treatment group. As a result, analysis by gender and age was not possible.

<sup>5</sup> Impact Assessment of Digital Intervention on Primary Hindi and Math Skills [in-community]-BGM Policy Innovation Pvt. Ltd-September 2013

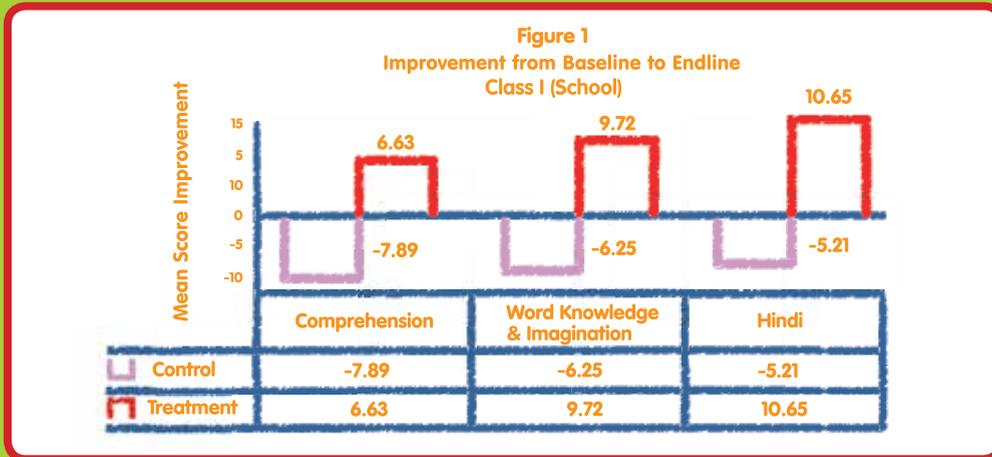
<sup>6</sup> Impact Assessment of Digital Intervention on Primary Hindi and Math Skills [in-school]-New Concept Information System Pvt. Ltd May 2014.

<sup>7</sup> Learn to Read, Read to Learn Report (I and II) I and Informatics Limited-May 2014, June 2015



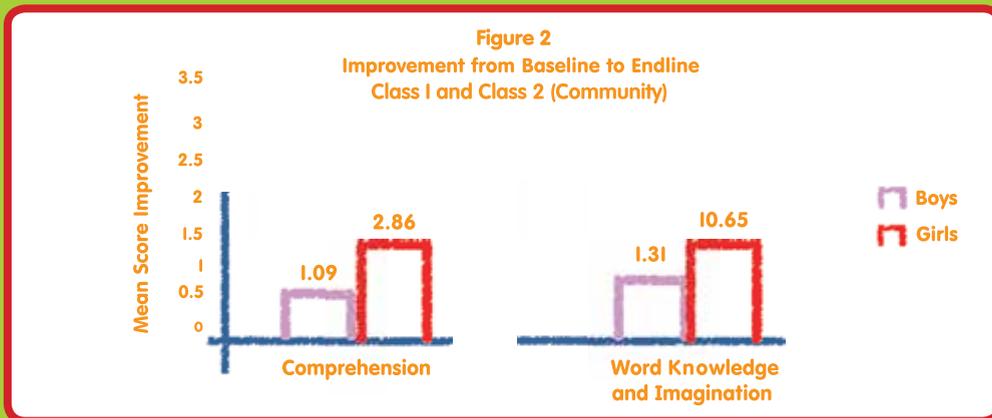


Some important findings: Children who received the GGSS intervention from Class I in the school study showed higher improvements (statistically significant at  $p < 0.05$ ) compared to the control group across Hindi measures (comprehension, word knowledge and imagination).



**3x:** Children exposed to GGSS in **Class I classrooms** showed **three times the improvement in word knowledge and imagination** as compared to children not exposed to GGSS.

Similarly in the community study, children from Classes I and 2 showed higher improvements (marginally significant at  $p < 0.1$ ) in comprehension, word knowledge and imagination.

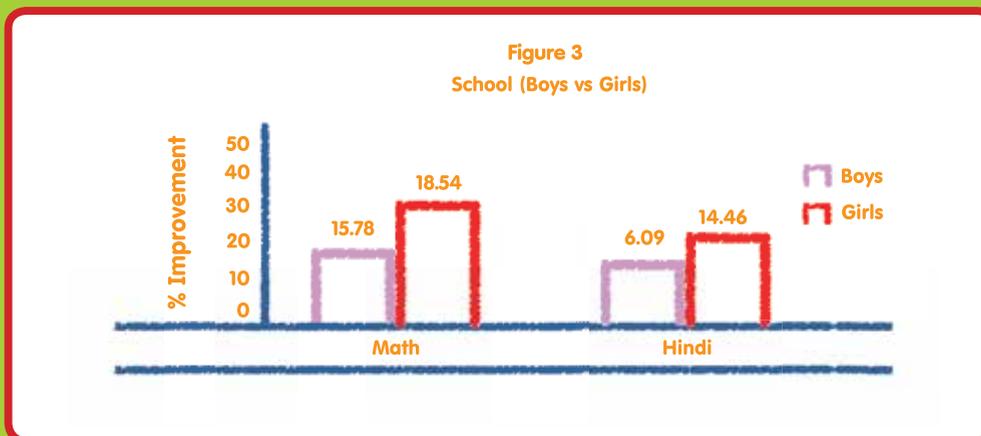


**1.5x:** Class I and 2 children from the **community** had **more than 1.5 times improvements in scores for word knowledge and imagination** as compared to children not exposed to GGSS.

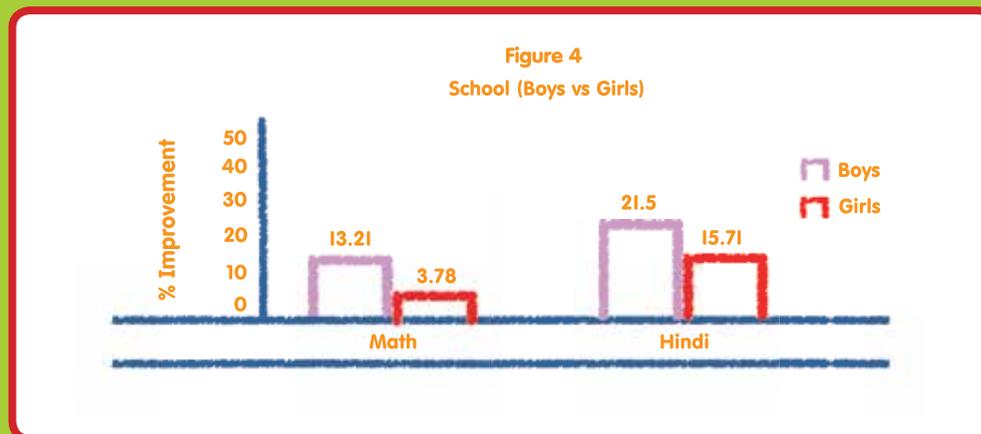
**2.5x:** Class I and 2 children from the **community** had **more than 2.5 times improvements in scores for Hindi comprehension** as compared to children not exposed to GGSS.

## Gender Differences

As shown in figure 3, girls from the school study performed better than boys in both Hindi and Math outcomes.



In the community study, boys outperformed girls (Figure 4) in almost all measures in Math and Hindi. It is likely that the difference between the two groups could be due to the fact that girls spent less time on the games as compared to boys, as is evident from the monitoring data.



Findings from the two studies in Bihar also indicate that the digital intervention is positively linked to gains in several outcomes with the treatment group. The group receiving the digital intervention scored:

- Significantly higher in all measures and for both grades 1 and 2 at the end of study I
- Results from Study II show that three of the treatment effects (initial sound identification, oral reading and listening comprehension), were positive and significant for children receiving the digital intervention when compared to their control counterparts

Qualitative data was collected from in depth interviews with teachers who were part of the intervention, observations of digital session (GGSS games on tablet) in classrooms, and focus group discussions with children who participated in the digital sessions in both Delhi and Bihar prior to and after the digital intervention.

Findings from qualitative studies in both Delhi and Bihar indicated that with time, children with no prior experience in using a tablets-

- Had developed an increased level of comfort with the tablets
- Were responding to directions in the game and progressing in the game
- Were willing to share the tablet with each other and to take turns

Peer support played a huge part at the beginning of project as children were observed helping each other progress in the games. As they got more familiar with the games, children needed less support from teachers and peers.

Additionally, teachers' attitudes towards using multimedia in the classroom improved. By the end of the intervention as they reported that:

- Their comfort level in using multimedia in classrooms has increased after using the intervention
- Majority of them felt that tablet sessions should be introduced in Grade 1
- Half of the teachers interviewed in Delhi said that the tablet sessions had improved students' attendance, especially on tablet session days
- Teachers also reported that tablet sessions received positive feedback from parents

# CONCLUSION

**Play 'n' Learn** was child-friendly and innovative. Despite the intervention's limited time frame, we were able to see its huge potential as a long-term, large-scale supplement to the existing educational offerings available to young children. This project provided valuable lessons and evidence of improvements in classroom environment and children's learning experience.

Children in government schools typically come from poorer families and, consequently, have fewer opportunities to use technology for learning than children who study in private schools. This project has shown they are quick in learning and tend to have fewer inhibitions keeping them from mastery in new technology. Working in groups was a welcome change from the usual chalk-and-blackboard method of learning. They loved the audio and video elements.

A positive impact on children's motivation and skills (as per teacher report), independent learning and teamwork was recorded. The reported increase in attendance of children demonstrates that GGSS can help improve school-environment experiences for children making learning more fun and interactive.

The intervention has also built teachers' capacities, in terms of both engagement and classroom management. Even though they are primarily used to the blackboard-and-chalk method, the children benefitted from this training. They observed and appreciated that children enjoyed the tablet sessions, that group work creates a dynamic classroom environment, and that multimedia technology can certainly help children to learn better.

The digital intervention has affected significant qualitative improvements for children in intervention classrooms. We see vast potential for improving and adapting the content and increasing the duration of the intervention so as to bring about quantitative improvements in children's learning outcomes.





## ACKNOWLEDGEMENTS

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Sesame Workshop in India through its flagship programme *Galli Galli Sim Sim*, uses the power of media to help kids grow smarter, stronger and kinder. We develop high quality and engaging content to distribute it through television, radio, community radio, print, digital and outreach, to reach kids aged 0-8. Our content aims to facilitate young Indian kids' basic academic and life skills, while celebrating India's rich cultural diversity, in order to promote their overall cognitive, socio-emotional and physical development.

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