

# PHONEMIC INTELLIGENCE (PI) GOVERNMENT SCHOOL PROGRAM Goa, India

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Annual Report 2018-2019



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# PHONEMIC INTELLIGENCE GOVERNMENT SCHOOL PROGRAM GOA, INDIA 2018-19

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## 1. EXECUTIVE SUMMARY

Following the remarkable results of the initial 20 school pilot study program in 2016-17 and 2017-18, the Director of Education of Goa extended the PI Program to include all Government schools in Goa for the academic year 2018-19. Accordingly the Phonemic Intelligence (PI) Government School Program was launched in all 856 Government Schools in the state of Goa in June 2018.

PI is an intelligence based program that uses selected phonemic sounds to activate key parts of the brain for learning. PI was developed by Baskaran Pillai, PhD, as an innovative educational technology that addresses learning as well as behavioral problems commonly found in schools across the globe. (More details on the science behind the PI Program can be found in the attached brochure)

One of the essential goals of the School Education Action Agenda is to provide tools to teachers and students for effective learning. The PI Program for Government Schools recognizes this goal that school learning education as a public service component has a critical role in the growth, structure, and welfare of society. Our core vision is to break down barriers for learning and the teaching process and set the benchmark for successful school education through our Phonemic Intelligence Program.

This report highlights the PI Program components implemented in the academic year 2018-2019 and the results that were obtained. Our research proves that the PI Program created significant, as well as dramatic improvements across critical cognitive abilities in students.

## 2. PSYCHOMETRIC TEST STUDY

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An independent research study was conducted along with the PI Program in 2018-2019. The primary objective of the study was to investigate the efficacy of the PI intervention in improving academic and behavioral changes in the student population.

Dr. Gopukumar Kumarpillai Ph.D., (Fel.Canada) Consultant Neuropsychologist from Bangalore Neuroscience Center was the Principal Research Investigator for Psychometric Test Study. The neuropsychological tests used in the study are from the NIMHANS neuropsychological battery. A few of these neuropsychological tests were adopted according to age, gender and educational specific norms (Rao, Subbakrishna & Gopukumar, 2004).

All 856 schools (primary, middle and high schools) participated in the research study. The children were tested three times during the one-year program.

# 3. SUMMARY OF PSYCHOMETRIC TEST FINDINGS

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The research examined the impact of the PI Program on cognitive functions among 30,961 students. The result of this study demonstrates that after the PI Program, the scores of the children showed a significant improvement as compared to scores before program implementation.

A significant, positive improvement was observed in the following competency areas:

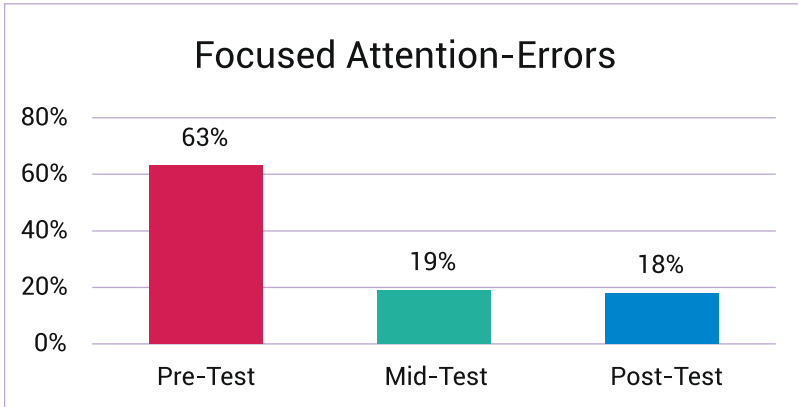
1. **Attention/concentration**
2. **Executive functions**
3. **Motor speed**
4. **Mental speed**
5. **Working memory**

The schools which practiced PI twice daily, proved even more dramatic results than the schools which practiced PI once daily. The outcome of the research study supports the conclusion that the PI Program proves useful in a school setting to overcome cognitive difficulties and improve classroom behavior and academic performance of students.

Please see **Annex 1** for the detailed research study findings - *'Phonemic Intelligence intervention techniques influencing the brain functioning, educational performance and decision-making capacity of school students in Goa.'* Dr. Gopukumar Kumarpillai Ph.D., (Fel.Canada) Consultant Neuropsychologist from Bangalore Neuroscience Center.

In the graphs below, the data obtained from each test over the course of the year shows significant improvement across all cognitive functions tested.

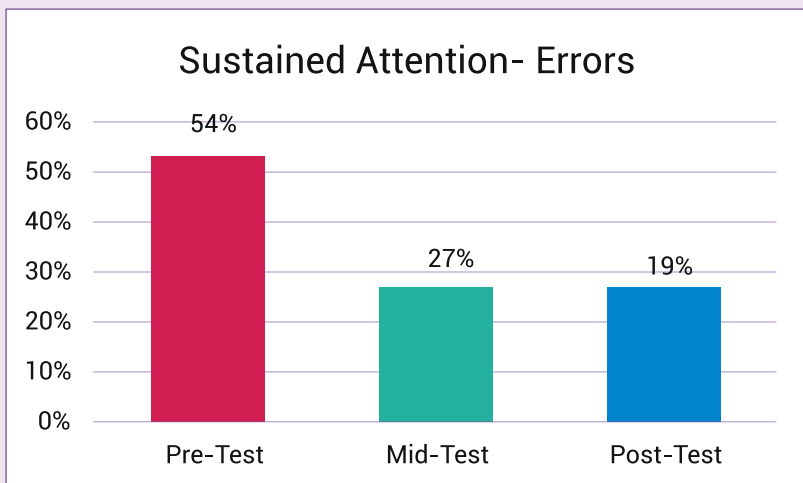
### 3.1 PSYCHOMETRIC TEST RESULTS FOR GOVERNMENT PRIMARY SCHOOLS



Color Cancellation Test:  
Focused Attention



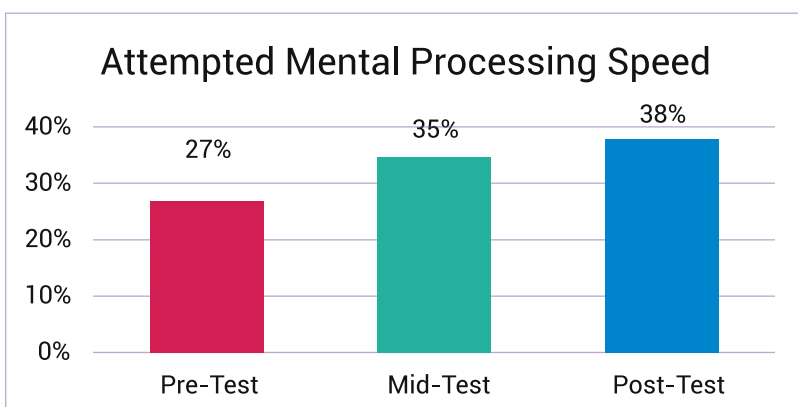
**Errors in focused attention  
reduced from 63% to 18%**



Digit Vigilance Test:  
Sustained Attention



**Errors in sustained attention  
reduced from 54% to 19%**



Digit Symbol Substitution Test:  
Mental Processing Speed

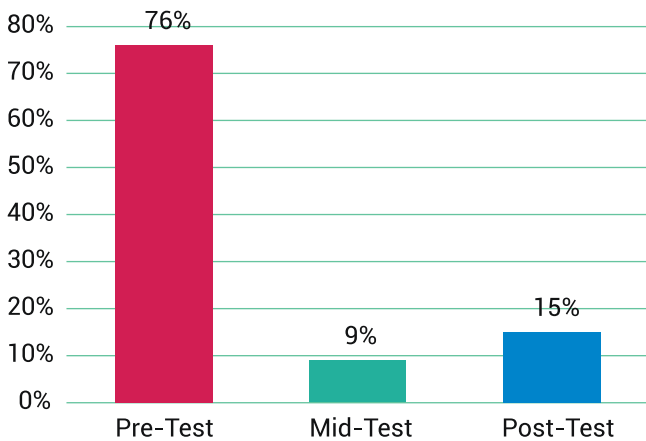


**Mental Processing Speed  
increased from 27% to 38%**

## 3.2 PSYCHOMETRIC TEST RESULTS FOR GOVERNMENT MIDDLE SCHOOLS

### Color Cancellation Test: Focused Attention

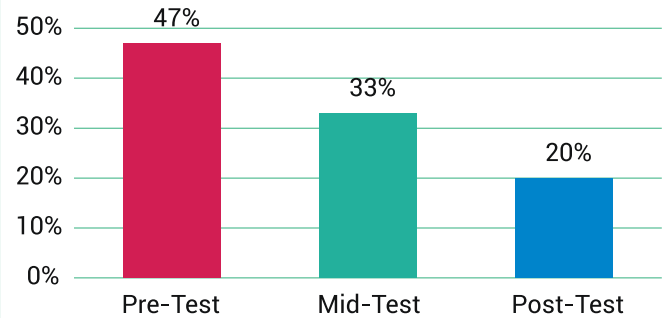
#### Focused Attention -Errors



**Errors in focused attention reduced from 76% to 15%**

### Digit Vigilance Test: Sustained Attention

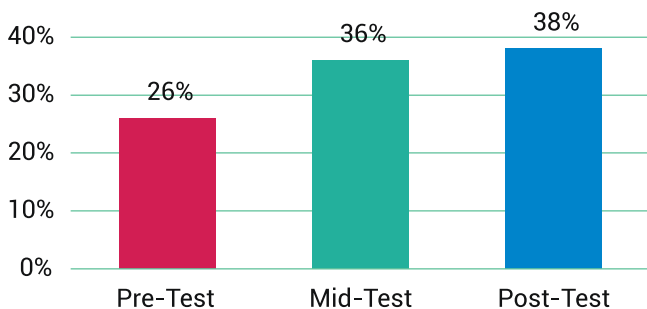
#### Sustained Attention-Errors



**Errors in sustained attention reduced from 47% to 20%**

### Phonemic Fluency Test: Verbal Fluency

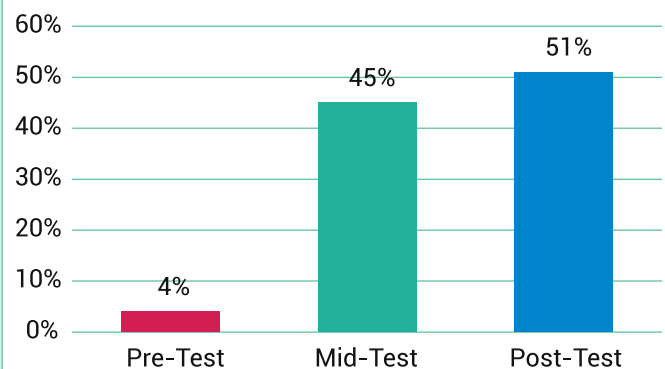
#### Verbal Fluency



**Verbal Fluency increased from 26% to 38%**

### Design Fluency-Free Condition Test: Cognitive Flexibility

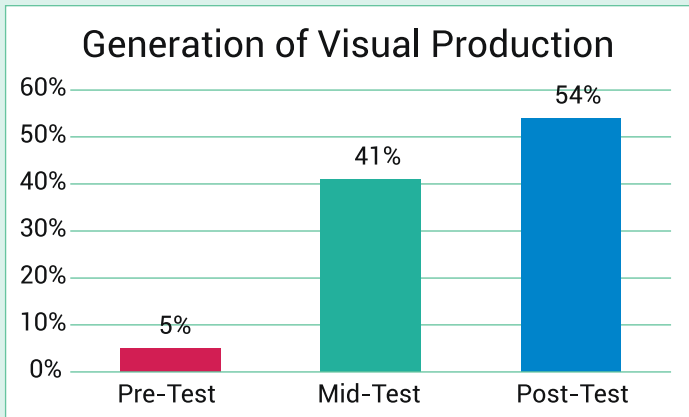
#### Cognitive Flexibility



**Cognitive flexibility increased from 4% to 51%**

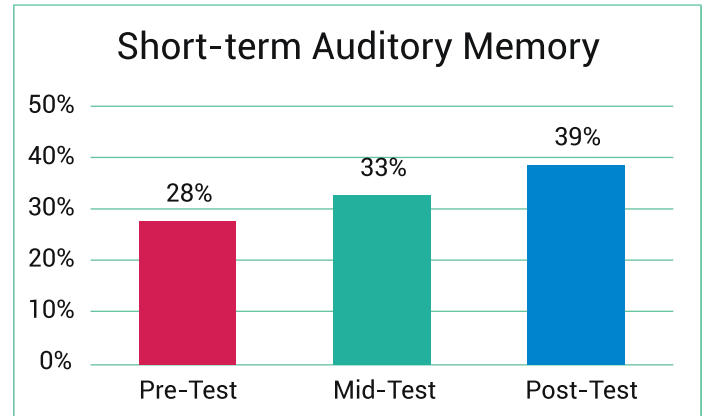
## 3.2 PSYCHOMETRIC TEST RESULTS FOR GOVERNMENT MIDDLE SCHOOLS

### Design Fluency-Free Condition Test: Visual Production



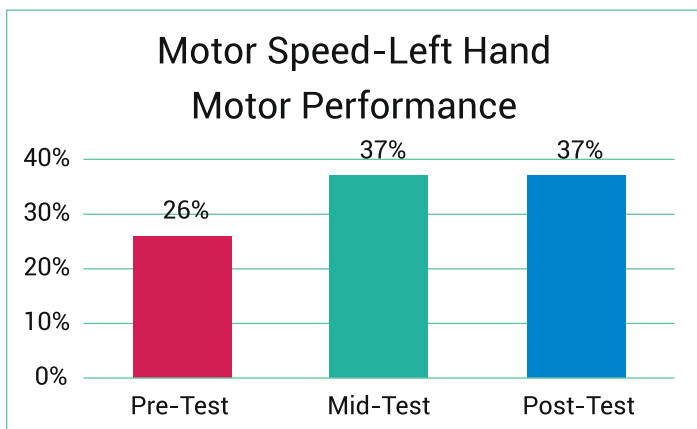
**Visual production increased from 5% to 54%**

### Digit Span Forward Test: Short Term Auditory Memory



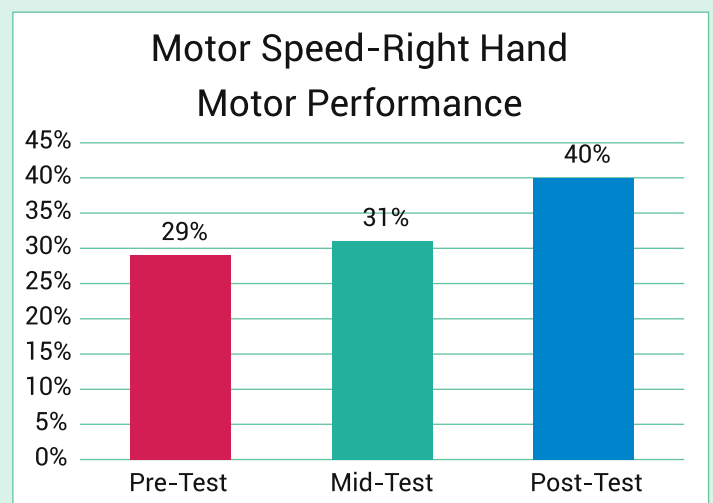
**Short term auditory memory increased from 28% to 39%**

### Motor Speed Performance Left Hand Test: Motor Speed



**Sensory motor speed-Left Hand increased from 26% to 37%**

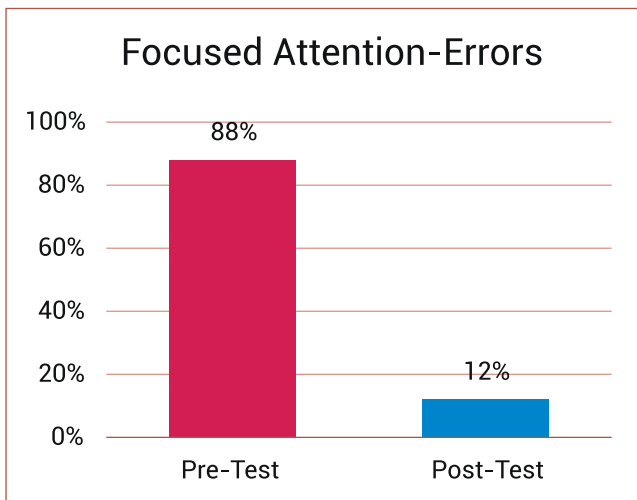
### Motor Speed Performance Right Hand Test: Motor Speed



**Sensory motor speed-Right Hand increased from 29% to 40%**



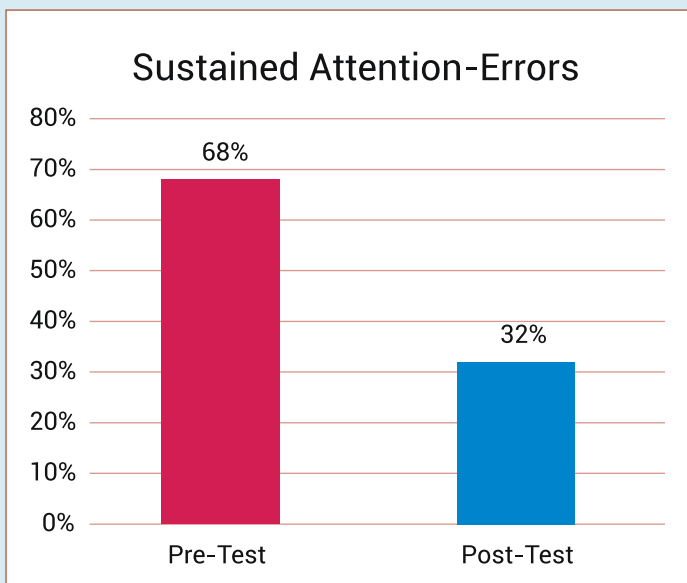
### 3.3 PSYCHOMETRIC TEST RESULTS FOR GOVERNMENT HIGH SCHOOLS



Color Cancellation Test:  
Focused Attention



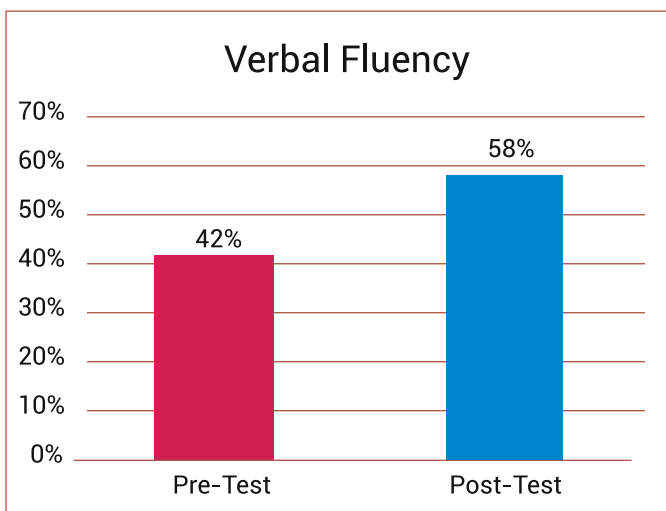
**Errors in focused attention  
reduced from 88% to 12%**



Digit Vigilance Test:  
Sustained Attention



**Errors in sustained attention  
reduced from 68% to 32%**

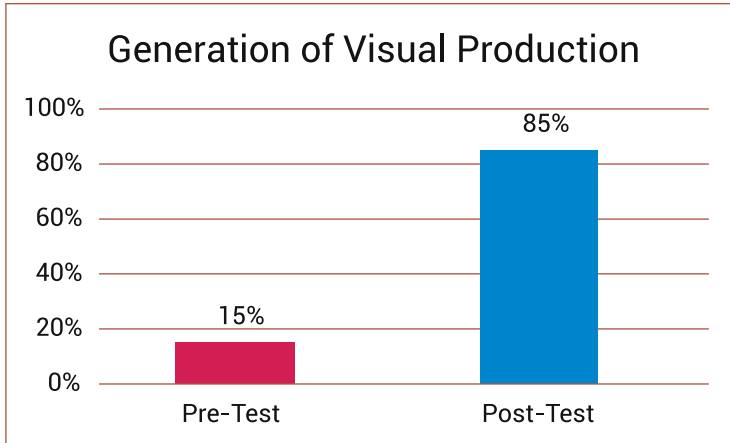


Phonemic Fluency Test:  
Verbal Fluency



**Verbal Fluency increased  
from 42% to 58%**

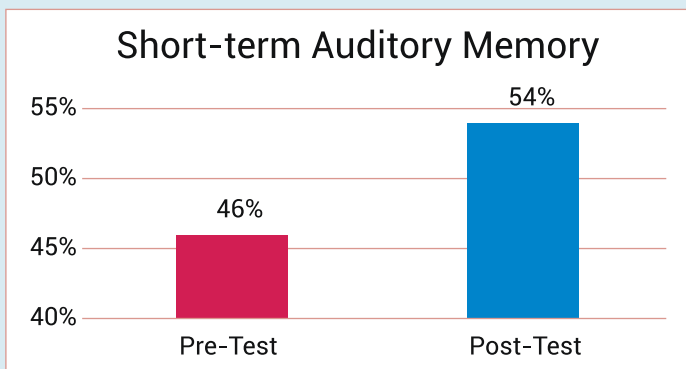
## STUDY RESULTS FOR GOVERNMENT HIGH SCHOOLS



Design Fluency-  
Free Condition Test:  
Generation of Visual Production



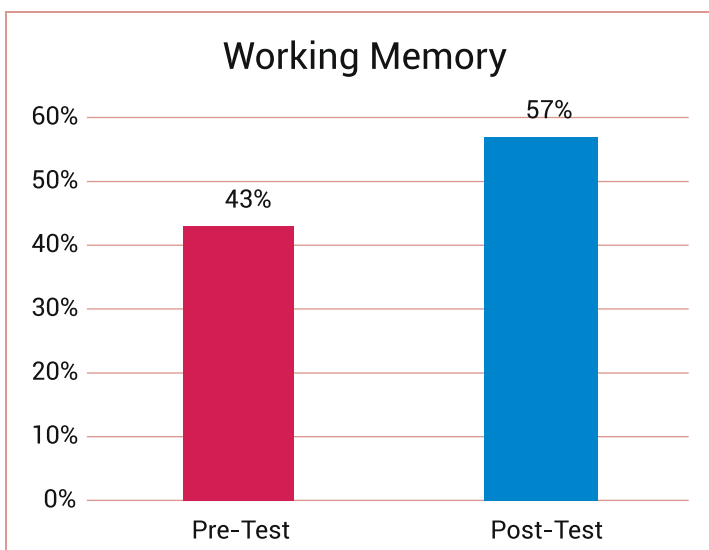
**Visual production increased  
from 15% to 85%**



Digit Span Forward Test:  
Short-term Auditory Memory



**Short term auditory memory  
increased from 46% to 54%**



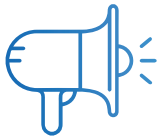
Digit Span Backward Test:  
Working Memory



**Working memory increased  
from 43% to 57%**

# KEY FINDINGS OF PSYCHOMETRIC TEST ANALYSIS FOR 2018 TO 2019

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The data shows significant improvement in attention, memory, executive functions and cognitive flexibility in students.



Schools which practiced PI twice daily showed even more dramatic results than the schools which practiced PI once daily.



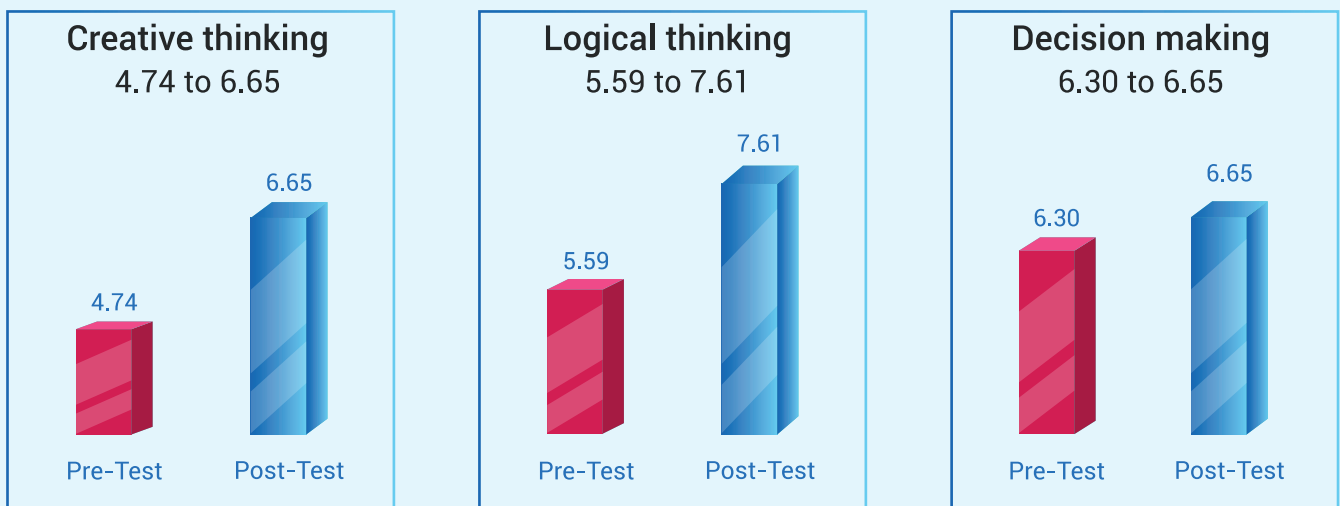
Research supports the conclusion that PI training proves useful in a school setting to overcome cognitive difficulties and improve classroom behavior and academic performance of students.

# PI PILOT STUDY 2016-2017 PSYCHOMETRIC TEST RESULTS

Tripura Foundation implemented a PI Pilot Program in 20 government high schools in Goa in the academic year 2016-2017. A psychometric test study was conducted.

The psychometric test was designed by Dr.Mita Mazumdar, retired clinical psychologist from Institute of Psychiatry and Human Behavior-Goa. The test assessed students in 4 areas - logical thinking, creativity, decision making and behavior.

The 2016-2017 data shows significant improvement in



Behavior

statistically significant at **.05 level**

The dramatic results from the Psychometric Test Study conducted for the academic year 2018-2019, as compared to the academic year 2016-2017, is attributed to Tripura Foundation's comprehensive program implemented at a significant cost.

Expenses Incurred



Rs. 2,12,91,000

Staff



120

Program's Key Components



8

# 4. PI PROGRAM 8 KEY COMPONENTS

## 1. PI PROGRAM TRAINING FOR TEACHERS AND STUDENTS

Phonemic Intelligence (PI) training was delivered in all 856 individual schools to 2458 teachers and 30961 students. The students and teachers were trained on how to practice the 7 minute PI technique, designed to activate key learning areas of brain functionality. The technology is based on the research findings on the impact of phonemes on brain areas.

Analysis of Cerebral Cortical Response to Non-Linguistic Phonemes, World Care Clinical: 2016. Lead Harvard researcher used functional MRI to examine the impact of PI on the brain.

Phonemic Effects on the Human Brain as seen with EEG: A Pilot Study by Brain Science International: 2012

## 2. PSYCHOMETRIC TEST

Psychometric tests administered in 3 phases– pre-test, mid-test, and post-test.



### 3. WEEKLY MONITORING IN ALL SCHOOLS

120 PI Program teachers were recruited and trained to deliver PI training and brain science lessons in schools. They were also given exclusive training on how to monitor the PI Program in schools every week. During their weekly visits, PI teachers monitored PI practice and scored technique performance using a fidelity sheet. Regular guidance was given on the proper practice of the PI technique. PI teachers obtained regular feedback from teachers and students.

### 4. PARENTS TRAINING SESSIONS IN PI TECHNIQUE

PI Program teachers delivered an exclusive training session on the PI technique to parents who were also briefed about key brain functions and the benefits from regular practice of PI. Parents were given guidance on how to support their children to practice PI at home regularly.

The outcome of the parents training sessions was that the students started practicing PI at home, which created better results in their overall behaviour and academic performance. Also, the parents who practiced PI reported that they feel calmer, which has led to an improved home environment.

No of Parent Sessions	Total No. of Parents Trained
576	5204



## 5. WEEKLY BRAIN SCIENCE LESSONS IN GOVERNMENT PRIMARY SCHOOLS

PI teachers delivered weekly brain lessons to students of Government Primary Schools. The lessons were structured to be easy to understand and creative teaching aids were used for lesson delivery.

The outcome of the weekly brain lessons is that the students understand the key functions of important brain parts, which has made them more conscious about their performance in their routine activities, overall personality, and academic performance.

Lesson Outline	Left Brain	Right Brain
Location	Location of the left brain was taught with teaching aids	Location of the right brain was taught with teaching aids
Functions	<ul style="list-style-type: none"> <li>◆ Maths and science</li> <li>◆ Language</li> <li>◆ Reading</li> <li>◆ Number skills</li> <li>◆ Right-hand control</li> <li>◆ Reasoning</li> <li>◆ Logic</li> <li>◆ Analytical skills</li> </ul>	<ul style="list-style-type: none"> <li>◆ Creativity</li> <li>◆ Music and art awareness</li> <li>◆ Intuition</li> <li>◆ Imagination</li> <li>◆ Visualization</li> <li>◆ Safe actions</li> <li>◆ Positive feelings</li> <li>◆ Emotions</li> </ul>
Brain Activities	<ul style="list-style-type: none"> <li>◆ Reading-based activities</li> <li>◆ Mathematical puzzles</li> <li>◆ Building blocks</li> </ul>	<ul style="list-style-type: none"> <li>◆ Creative writing</li> <li>◆ Critical thinking</li> <li>◆ Perception and shapes</li> <li>◆ Inquiry-based activity</li> <li>◆ Safe action</li> </ul>
Skills Involved	Logic, Reading, Reasoning	Creativity, Visualization, Safe actions, Emotions





## 6. TALUKA LEVEL ORIENTATION FOR ALL HEADMASTERS

Orientation session on Phonemic Intelligence Program was conducted for all Headmasters in all 12 taluks of Goa. The purpose of the orientation session was to share the scientific research on the PI Program, benefits for students and teachers and the various components of the program for the entire academic year.

Taluka	Date	No.of teachers present	Venue
Pernem	28/9/18	65	A.D.E.I Pernem
Bicholim	4/10/18	79	Govt.Higher Sec Sanquelim
Bardez	4/10/18	59	A.D.E.I Mapusa
Sattari(session 1)	5/10/18	80	A.D.E.I Valpoi
Sattari(session 2)	2/11/18	91	A.D.E.I Valpoi
Sanguem and Dharbandora	12/10/18	112	Gurukul Hall, Sanguem
Quepem	4/12/18	56	A.D.E.I Quepem
Marmugao	4/12/18	20	A.D.E.I Marmugao
Salcette	5/12/18	42	Zonal Office , South Goa
Canacona	5/12/18	59	G.P.S Chavdi, Canacona





## 7. MONTHLY ADEI AND HEADMASTERS MEETING

Month	Agenda
November	<ul style="list-style-type: none"> <li>◆ Correct technique of PI practice; the role of school teachers</li> <li>◆ Importance of practicing PI twice</li> <li>◆ Implementation of star chart to motivate and correct, and regular PI practice</li> </ul>
December	<ul style="list-style-type: none"> <li>◆ Plan for brain science lessons and brain activities</li> <li>◆ Lesson Structure and activities for Left brain</li> <li>◆ Parents training sessions</li> </ul>
January	<ul style="list-style-type: none"> <li>◆ Lesson Structure and activities for Right Brain</li> <li>◆ Standard activities to be used only for the PI program and not for any other program</li> </ul>
February	<ul style="list-style-type: none"> <li>◆ Collection of marks of final examination held in April 2018 and April 2019</li> </ul>
March	<ul style="list-style-type: none"> <li>◆ Revision of brain science lessons</li> <li>◆ Collection of HM PI program feedback</li> <li>◆ Collection of teacher feedback</li> <li>◆ Collection of student video feedback</li> </ul>



## 8. SCHOOL VISITS BY EXPERTS

Dr. Gopukumar Kumarpillai and Dr. A.V. Srinivasan visited schools to evaluate the progress of the PI Program.

- ◆ Dr. Gopukumar Kumarpillai, Postdoctoral research training in neuropsychology at The National Institute of Mental Health and Neuro Sciences (NIMHANS) and three years Postdoctoral research/clinical (Neuropsychology) work at Foothills Hospital, Department of Neurosciences, Calgary University, Canada.
- ◆ Dr. A.V. Srinivasan is the President of the Indian Neurologists Association, Former Senior Civil Surgeon and Professor of Neurology and Head of the Department Institute of Neurology, Madras Medical College & Research Institute, Chennai.



# 5. EXPENDITURE INCURRED BY TRIPURA FOUNDATION FOR PI PROGRAM IN 2018-19 FOR 856 GOVERNMENT SCHOOLS

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		Total Expenses
1	Salaries @ Rs12,000 Pm -120 Teachers	1,58,40,000
2	Conveyance @ Rs 150/- Per Trip	45,54,000
3	Research Expenses	5,00,000
4	Psychometric Testing Material And Booklets	2,50,000
5	Office Rent @ Rs 22,000/- Pm	92,000
6	Stationary and Photocopy	35,000
7	Training Expenses	20,000
<b>TOTAL</b>		<b>Rs. 2,12,91,000</b>