



Akshara Foundation
Every child in school and learning well



Nagu Nagutha Ganitha

A Remedial Math Programme in
Government Primary Schools in Bangalore North
Analytical Report
April 2009

Research and Evaluation

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Analytical Report

'Quality concern, a very feature of systemic reform implies the system's capacity to reform itself by enhancing its ability to remedy its own weaknesses and to develop new capabilities'- (National Curriculum Framework-2005).

Background

Studies and assessments conducted in schools reveal that there is a definite gap between school textbook content and the actual learning that happens in the classroom. A lot of teachers say that children find mathematics one of the most difficult subjects to learn. Children say that it is uninteresting and tough to understand. Learning outcomes are poor. Std. IV and Std. V children still struggle with basic mathematical operations. Hence, there is a definite need for intervention.

Developing children's abilities for mathematisation is the main goal of mathematics education. School mathematics aims to develop 'useful' capabilities, particularly those relating to numeracy-numbers, number operations, and measurements and so on. The overall aim is to develop child's ability to think and reason mathematically and arrive at logical conclusions and handle abstraction.

The National Curriculum Framework clearly points out that the curriculum must explicitly incorporate the progression that the learners make from the concrete to abstract while acquiring the concepts.¹

'Nagu Nagutha Ganitha' an in-school pedagogy programme implemented by Akshara Foundation which aims at providing a 'Joyful Mathematics' that helps the child to have a deeper understanding of basic concepts in mathematics through concrete TLMs and activities in the classroom. The curriculum was researched, developed and designed by Dr. T. Padmini, Emeritus Professor of Education, University of Mysore. Dr. Padmini is also a Trustee of Pratham Mysore. This programme has been adopted by Government schools as a remedial teaching package that reaps maximum effect within a stipulated timeframe.

Akshara Foundation rolled out NNG in the year 2007-08 across 834 government schools in Bangalore South district. At the end of the programme it was found that²

- Overall, the average score of children in the programme increased from 65.8% on the 20th-day test to 75.8% on the 60th-day test.
- Standard deviation decreased from 21.2 percentage points to 17.3 percentage points from the 20th-day test to the 60th-day test.
- 73% of children scoring below 60% on the 20th-day test had moved to scoring above 60% by the end of the programme.

¹ National Curriculum Framework 2005, NCERT

² **Nagu Nagutha Ganitha**, A Remedial Math Programme in Government Primary Schools in Bangalore South Analytical Report, June 2008

- 89% of children scoring below 60% on the 20th-day test had increased their score by at least one “rung” (a score bracket of 20 percentage points) by the end of the programme.

Thus it is clear that there was a positive impact of the programme on learning of mathematics across Government schools in 5 blocks in Bangalore at primary level. These results encouraged the government to expand the programme. In 2008-09 the programme was rolled out in 467 government schools (both Kanada & Urdu) in Bangalore North district.

NNG 2008-2009 - A quick Glance

As mentioned elsewhere 467 schools from North blocks- North 1, North2, North3 and North4 - participated in NNG covering children from class 2 to class 5 i.e. all the children from Lower Primary section were part of the NNG in 2009. The table below shows that 16351 children participated in the programme, that those who under went 60 sessions and who took part in both pre and post test.

Table 1 Participation in NNG

| Total Number of schools in Bangalore | Total Number of schools in North Block | Total Number of Schools participated in NNG | Percentage of schools participated in NNG | Number of centres for NNG |
|--------------------------------------|--|---|---|---------------------------|
| 1412 | 509 | 467 | 91 | 1029 |

Out of 9 educational blocks of Bangalore district, 4 northern blocks participated in the current year NNG. So far as number of schools participating is concerned, out of 509 schools functioning in the North district, 91% of the schools participated in NNG. Across 1029 centres were formed in 467 schools. Each centre accommodated around 15-20 children for 60 sessions of NNG.

Table 2 Participation of Children by class

| Class | Absolute Numbers | | | Percentage of children participated in NNG |
|-------------|------------------|-----------------|-----------------|--|
| | Bangalore* | Bangalore North | Bangalore North | |
| Class - II | 29985 | 14096 | 4679 | 33 |
| Class - III | 30372 | 14158 | 4617 | 33 |
| Class - IV | 34808 | 16463 | 4674 | 28 |
| Class - V | 32245 | 15089 | 4443 | 29 |
| Total | 127410 | 60357 | 18413 | 31 |

*Source of data: KLP 2009

The above table shows that around 27% of the children participated in NNG in 2008-09. Relatively more number of participants were found in class 2 and 3. This also indicates that

there were around 27% of the children who required remedial teaching in Mathematics in the current year.

We have considered 16161 children for this analysis. The analysis is carried out across the classes as well as across the Blocks. Children present for both pre-test and post-test were considered for analysis.

NNG the Programme³ and implementation:

The programme consisted of 60 open-ended sessions designed to address foundational mathematical competencies. These sessions on NNG got institutionalized and were integrated with PariharaBhodane. As a result NNG was carried out in 2 academic sessions a week per class in each school. The programme was designed in such a way that a 'centre' of 15-20 children was formed in each school. Depending on the number of children each school has minimum of 1 and maximum of 16 centres⁴.

Dr. T Padmini of Pratham Mysore designed the methodology, a child-centric, activity based approach to mathematics. Dr. Padmini and her team trained government teachers in Bangalore to implement the programme through a train-the-trainer method. Akshara provided materials, implementation support, monitoring, evaluation, and documentation.

This report presents detailed quantitative analysis of the programme results, based on child-level census data from 2 assessments, one conducted on enrolment into the programme (Pre-Test) and one after the 60th day (Post-Test). Children were tested on 4 competencies – Numeracy, Four Operations, Quantitative Reasoning, and Mental Math – and scores were weighted in an age-appropriate manner to calculate a composite percentage score.

The Approach

NNG follows a thinking strategies approach, helping children to develop basic arithmetic skills rather than memorizing information. Strategic instruction is a valuable 'tool of the mind,' promoting mental arithmetic. Thinking strategies allow 'Divergent Thinking,' that is, finding different ways to solve a single problem, thus reducing rote learning. Thinking strategies also allow differently-abled children to proceed at their own pace.

The methodology covers 4 basic competencies. The competencies are specifically selected remedial; all represent basic concepts necessary to develop higher-order mathematical thinking skills.

1. **Numeracy (C1)** – Number concepts and place value
2. **Four Operations (C2)** – Addition, subtraction, multiplication, and division
3. **Quantitative Reasoning (C3)** – Shapes, money, calendar, time
4. **Mental Math (C4)** – Problem-solving without written calculations

The NNG curriculum helps children develop a deep understanding of mathematical concepts by linking concrete, representational, and finally abstract experiences.

³ Most of the information cited in this section is borrowed by various reports on NNG published earlier.

⁴ GUMPS Goagarden school of DJ Halli cluster recorded highest number of centres.

The Math Kit

The math kit, a set of teaching-learning materials provided to teachers as part of the NNG curriculum, is designed to help children link the concrete to the abstract. For concrete experience, for example, the Padmini Counting Board uses counting beads to help children develop up to five-digit numeracy skills. Next, for representational experiences, number grids help children link number concepts with written numbers. A variety of number grids provides identification of number gradation, number patterns etc. A number grid used as an aid or a reference card to perform different arithmetical tasks helps children to develop representational thinking by absorbing into visual memory the number patterns made available in the grid. Finally, for abstract thinking, a series of mathematical games and puzzles and interactive sessions to solve the mathematical problems of daily life exercises oral and mental arithmetic skills. The Padmini Counting Board is central to the NNG curriculum and has received wide acclaim from teachers. The counting board borrows richly from an ancient game, the age-old pallanguzhi or pallankuli or Alaguni Mane, played in South India, especially in Tamil Nadu and Andhra Pradesh. In its NNG manifestation, the counting board consists of four plastic strips and a set of place value counting chips representing units, tens, hundreds, thousands and ten thousands. The plastic chip for each place value has been designed in a different colour and shape.

In addition to the counting board and the number grids, the math kit provided to each "centre" the following:

- i) Flash cards for basic functions and to play quizzes and games to solve the mathematical problems of daily life situations.
- ii) A measuring tape and a specially designed clock with rotating needles, with the sixty minutes of the hour clearly marked.
- iii) Look-alike currency notes and coins give children an idea of money and how to deal with it – count, calculate and manage the change.
- iv) Workbooks to help children practice translating their concrete experiences into representational and abstract thinking as they would on a conventional exam.
- v) A set of wooden geometric shapes that fit together to form a square

The Methodology

Nagu Nagutha Ganitha was tried and tested in government primary schools in Mysore by Pratham Mysore. In January 2007, a short 30-day pilot in select schools in Bangalore South and North was conducted to test the effectiveness of the programme locally before rolling out the programme across Bangalore South. In 2007 the programme was rolled out in all the schools at South blocks and Anekal in which 35768 children were part of the programme. In 2008-09 academic cycle the programme was implemented in all schools of Bangalore North district. NNG sessions were taught in small groups; under 20 children were assigned to each teacher in the programme.

The Multi-grade and multi-pace being a reality in majority of the Indian schools, the NNG model is designed to suite this situation. It is open-ended, allowing freedom for imagination and creativity. The child here studies at his or her own pace and there is sufficient room for learning hands-on with the given material through games, puzzles and activities. At the same time, NNG does not in any way deviate from the school curriculum. The only difference is that concepts are taught using concrete tools like a counting board and number grids, helping

children see, do, learn, and hence, comprehend mathematics, rather than the conventional blackboard method. NNG signals a shift from convention while remaining well within the purview of the school syllabus. The programme allows the child to leverage her natural creativity and curiosity to explore different ways to arrive at a solution.

The NNG addresses two levels: Level 1 and Level 2. Children from Class 2 and 3 forms Level 1, and children from Class 4 and 5 comprise Level 2. NNG begins with a foundation of number concepts and progresses gradually, covering the four basic operations of Mathematics and going up to fractions and decimals for Level 2 children.

The Assessment Process

Teachers selected the children who were part of Pariharabhodane. And these enrolled children went through a diagnostic test with the objective of testing to measure the children at their 'entry level.' A similar test on the four competencies was given at the end of 60 sessions ('post-test') to measure impact relative to the entry level. The same types of questions were used both on pre- and post-tests to analyze the effectiveness of the programme. The assessment tools took care some of the subtleties like grade specific competencies and the learning level of the child. Both pre and post test therefore, had test papers designed for class 2, class 3, class 4 and 5.

Modes of Assessment

The test includes questions on each of the four programme competencies (Numeracy (C1), Four Operations (C2), Quantitative Reasoning (C3), and Mental Math (C4)). The tests on Numeracy and Four Operations are paper and pencil tests, while the tests on Quantitative Reasoning and Mental Math are aural tests, wherein the teacher reads out the question and the children listen, comprehend and write the answer in the given paper. All the children were tested on the four given competencies, and the weight age of marks per competency varied from class to class, at the age-appropriate level.

Diagnostic Testing

The assessment is designed as a diagnostic test and covers a narrow range of competencies which are considered essential to learning higher order concepts. It is not a general 'achievement' test that mainly appraises the overall performance of the whole class, covering a wide range of content. Diagnostic testing analyses the problems and deficiencies in student's learning, which, in turn, helps the teacher to choose the appropriate content and thinking strategies to address in the remedial programme. Thus, the testing provides an 'error analysis' aiming at suitable remediation.

Interpretation of Test Scores

Each competency is tested and marked separately. An overall composite score, or total score, is also computed, based on the following marks breakdown, which weights competencies in a class appropriate manner.

Table 3

| Blue Print for Test Scores | | | | | | | | | | |
|----------------------------|----------|----|----|----|-------|-----------|----|----|----|-------|
| | Pre-Test | | | | | Post-Test | | | | |
| | C1 | C2 | C3 | C4 | Total | C1 | C2 | C3 | C4 | Total |
| Class 2 | 16 | 24 | 10 | 10 | 60 | 16 | 24 | 10 | 10 | 60 |
| Class 3 | 20 | 30 | 10 | 10 | 70 | 20 | 30 | 10 | 10 | 70 |
| Class 4 | 25 | 30 | 10 | 10 | 75 | 25 | 30 | 10 | 10 | 75 |
| Class 5 | 25 | 30 | 10 | 10 | 75 | 25 | 30 | 10 | 10 | 75 |

Achievement Rungs:

For Class 3, 4, and 5 children, the post-test covered the same competencies as the pre-test, but in a more comprehensive manner. Percentage scores were calculated for each competency per child from the raw scores. The percentage scores are then divided into 5 "Rungs" (levels in a hierarchy):

- Rung 1 – 1-20% Achievement
- Rung 2 – 21-40% Achievement
- Rung 3 – 41-60% Achievement
- Rung 4 – 61-80% Achievement
- Rung 5 – 81-100% Achievement

A similar percentage score and rung is calculated for each individual competency. For example, a child can be in Rung 5 for Numeracy and Rung 1 for Mental Math, with a composite score in Rung 4. For each child, there is also a "jump in rungs" – the number of rungs the child has moved (if any). For example, a child who began at Rung 1 on the Pre-Test and moved to Rung 3 on the Post Test day has "jumped" 2 rungs.

Enrolment

The Selection Process

Similar to the strategy adopted for the NNG in Schools covered in 2007-08, the current year too left the selection of beneficiaries to the schools. This approach capitalized on the fact that teachers knew their students' abilities the best. In the sense, the list children who could take part in NNG programme were identified by the schools themselves with the help of the concerned subject teacher of that particular class in the school. As a result there were 18413 children identified as eligible for entering the NNG in 2008-09. However, in order to be comprehensive, this report will focus analysis on the group of children who participated in NNG and those children who were present for both the Tests i.e. pre test and the post test.

The analysis shows that there was a positive response to the programme and the completion rate was almost 90%. On and average nearly 89% of the children took all the 60 sessions of NNG. While N4 showed that 90% of the children participated in NNG, the participation in N2 was relatively low i.e. 86%.

The data on class –wise participation shows that 89% of the children who were enrolled for the programme completed all the 60 sessions on NNG.

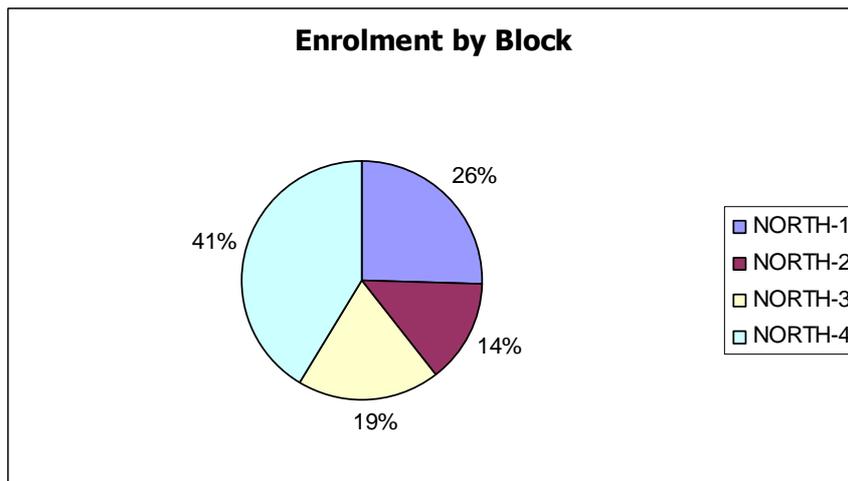
Table 4

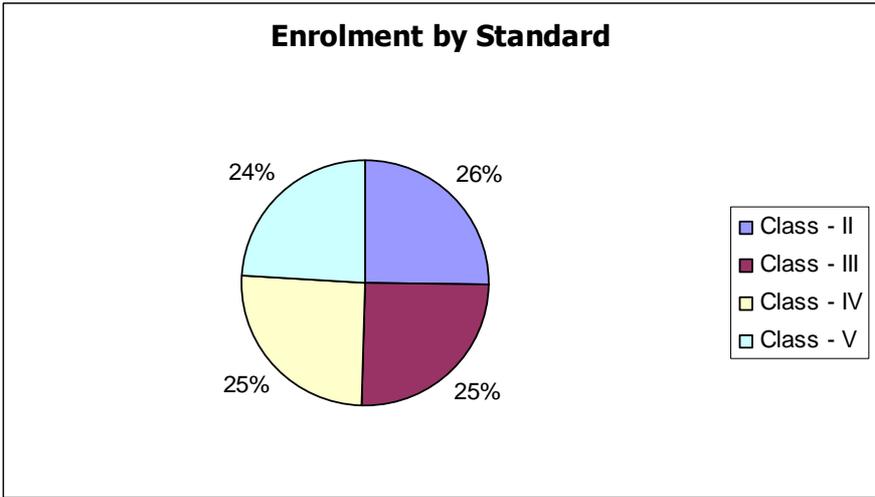
| Blocks | Total Enrolment | Total Present for the Both Tests | % of children Present for the Both Tests |
|---------|-----------------|----------------------------------|--|
| NORTH-1 | 4,724 | 4,163 | 89 |
| NORTH-2 | 2,526 | 2,141 | 86 |
| NORTH-3 | 3,543 | 3,140 | 89 |
| NORTH-4 | 7,620 | 6,717 | 90 |
| Total | 18413 | 16161 | 89 |

| Class | Total Enrolment | Total Present for the Both Tests | % of children Present for the Both Tests |
|-------------|-----------------|----------------------------------|--|
| Class – II | 4,679 | 4,106 | 88 |
| Class – III | 4,617 | 3,971 | 89 |
| Class – IV | 4,674 | 4,147 | 89 |
| Class – V | 4,443 | 3,937 | 89 |
| Total | 18413 | 16161 | 89 |

Data on enrolment clearly shows that there were 18413 children identified by the teacher’s specific to class and school. But on the day of Pre-Test it was found that around 2% of the children were either not presents for the test or some of the children from the list did not match. Similarly, it was also found that nearly 11% of the children who were part of the initial enrolment list did not appear for the Post test. This pattern seems to hold same across the classes.

Enrolment charts

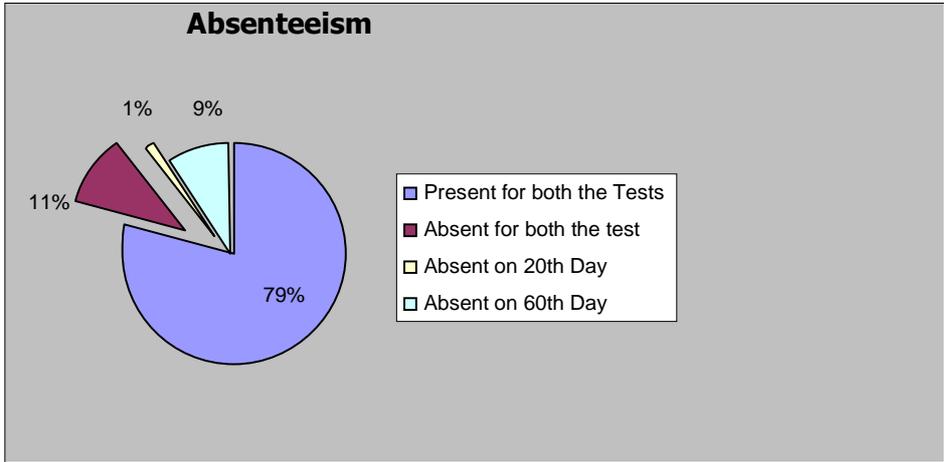




- North 4 reported highest enrolment to the programme (46%) and North 2 reported 26% enrolment out of total enrolment of children.
- Enrolment across the classes was more or less equally distributed.

Absentees

2,198 children were absent for either one or both the tests (the pre test and the post test). And there was data error in 257 assessment sheets. Therefore, further analysis will focus only on children who were present for both the pre- and the Post-tests (N=16161).



- 79% of the children were present in both, Pre and Post tests.
- 1% of the children were absent on the Pre-Test day out of the total number of children selected and listed by the participating North schools.

The Results

Summary

At the completion of the programme there was an overall jump of 21 percentage-points in average score from the pre test to the post test. There were reductions in the numbers of children in Rungs 1, 2, and 3 (children scoring below 60) and an increase in the number of children in Rung 4 and especially Rung 5. While there were no scorers in rung five which is defined as a slab of 81% to 100% achievement, the analysis shows that there are around 25 children who have achieved this.

The standard deviation also decreased noticeably by the Post-Test period, indicating that the programme may have helped to equalize learning levels in math, creating a narrower range of scores by the 60th session.

Table 5

| Summary Scores (N=16161) | | | | | |
|--------------------------|----------------------|----------|-----------|------------|--|
| | | Pre-Test | Post-Test | Difference | |
| Mean | Mean | 63.3 | 83.9 | 20.6 | |
| Std Deviation | Std Deviation | 22.5 | 14.2 | -8.3 | |
| Scores - 01-20% | Rung-1 | 682 | 23 | -659 | |
| Scores - 21-40% | Rung-2 | 2097 | 183 | -1914 | |
| Scores - 41-60% | Rung-3 | 3879 | 1020 | -2859 | |
| Scores - 61-80% | Rung-4 | 5273 | 3917 | -1356 | |
| Scores - 81-100% | Rung-5 | 4167 | 11013 | 6846 | |
| Scores - 0% | Children in '0' slab | 63 | 5 | -58 | |
| Total | | 16161* | 16161 | 0 | |

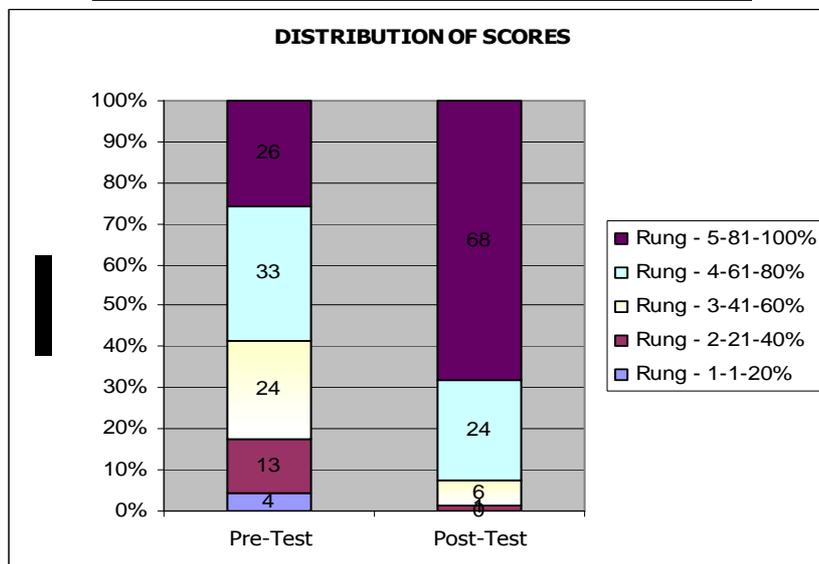
- It is clear that the Post-Test scores are positive as compared to Pre-Test especially in the lower rungs. That is children who were low scorers in the Pre-Test have moved forward in the Learning ladder by the end of the programme.
- There were 63 children who recorded to have scored '0' and this number came down to 5 at the end of the programme.

Distribution of Scores

Looking at the distribution of scores across the children who participated in the programme, the analysis shows that there were around 41% children who constituted the cohort of below 60% learning achievement has decreased to 7 % at the end of the Post –Test.

Table 6

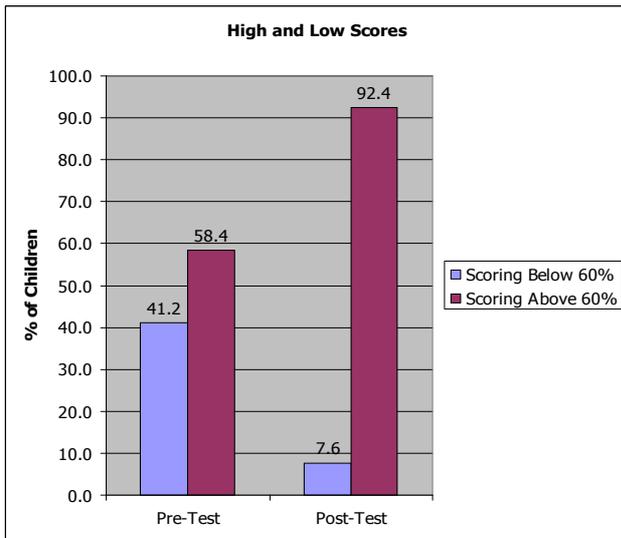
| Rungs | Pre-Test | Post-Test |
|------------------|----------|-----------|
| Rung – 1-1-20% | 4 | 0 |
| Rung – 2-21-40% | 13 | 1 |
| Rung – 3-41-60% | 24 | 6 |
| Rung – 4-61-80% | 33 | 24 |
| Rung – 5-81-100% | 26 | 68 |



- There is a definite movement of children from lower rungs of learning achievements to higher rungs from Pre-Test period to Post-Test period.

High & Low Scores

Analysis was carried out to compare the percentage of children in two slabs of above 60% achievers and below 60% achievers to see how the programme is impacting on these groups.



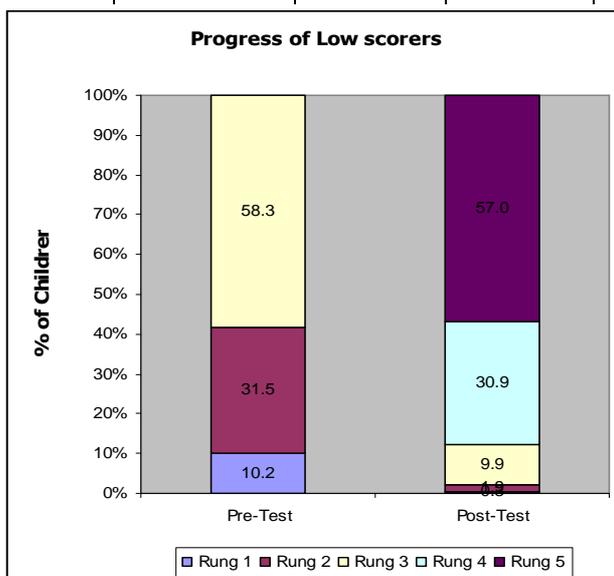
- Children from below 60% performance group have moved out of that and this number has come down from 41% to 7% in Post Test.
- As contrast to that there is a sharp increase in number of children in the Post-Test to 92% as compared to Pre-Test (58%)

Progress of Low scorers

The majority of the low scorers – 41%, or 6658 children—made some improvement by the end of 60 sessions. About 4% (388) of the children fell backward, a small percentage that could be the result of a wide range of causes.

Table 7

| | Rung 1 | Rung 2 | Rung 3 | Rung 4 | Rung 5 |
|-----------|--------|--------|--------|--------|--------|
| Pre-Test | 10.2 | 31.5 | 58.3 | | |
| Post-Test | 0.3 | 1.9 | 9.9 | 30.9 | 57.0 |



- At the time of Pre-Test there were 41% of the children who were in the last 3 rungs of the score chart (who had scored below 60%). NNG has reduced this percentage to 5% by pushing the low scores to higher rungs.
- The re-distribution of children from rung 1,2,3 to 1,2,3,4, and 5 shows that less than 1% children have remained in rung 1 and majority have jumped to rung 4 and 5.

Disaggregated analysis

Interesting Results:

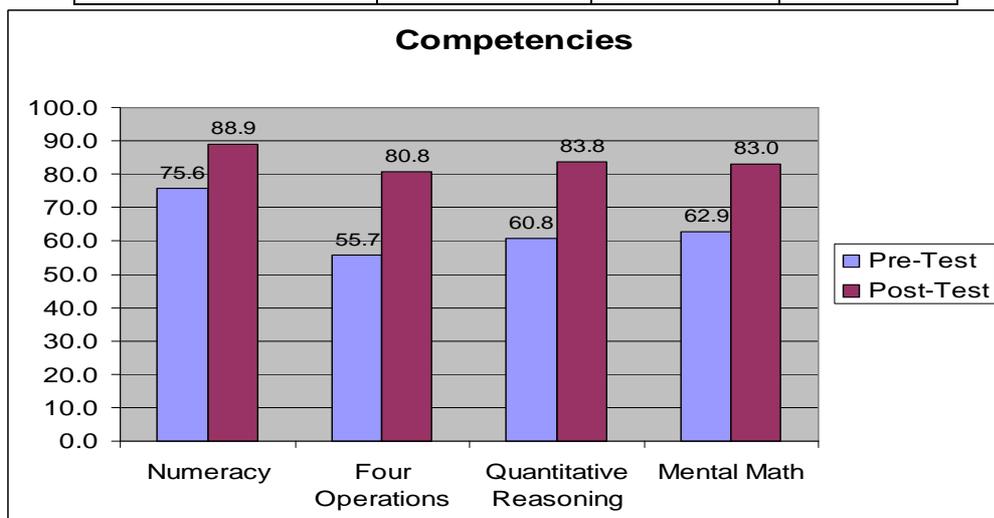
The effectiveness of the Programme, if looked from the point of those children who felt that Maths is a difficult subject to understand, the results show positive change in that segment. As seen in the above class wise Table, there were 63 children who scored '0' at the time of the Pre-Test. This number has come down to '5' by the end of the Post-Test. A disaggregated level analysis show that at least 50% of the children from this group have scored more than 50% marks at the end of the programme (see Appendix 2). There were as many as 14 children who had scored above 70% at the end of the programme.

Results by Competencies:

The overall results at competency level seem to be encouraging with highest being 25.1 for four operations.

Table 8

| | Pre-Test | Post-Test | Difference |
|------------------------|----------|-----------|------------|
| Numeracy | 75.6 | 88.9 | 13.3 |
| Four Operations | 55.7 | 80.8 | 25.1 |
| Quantitative Reasoning | 60.8 | 83.8 | 23.0 |
| Mental Math | 62.9 | 83.0 | 20.0 |



- The programme seems to have succeeded in helping more children to attain the math competencies of Four Operations and quantitative reasoning as compared to numeracy and mental math.
- It was found that the mean scores in numeracy were 75.6 points during the Pre-Test which increased to 88.9 points.
- The overall average in Four operations increased by 25.1 points at the Post-Test period.
- Similarly the data shows that the average scores in Quantitative reasoning went up by 20 points.

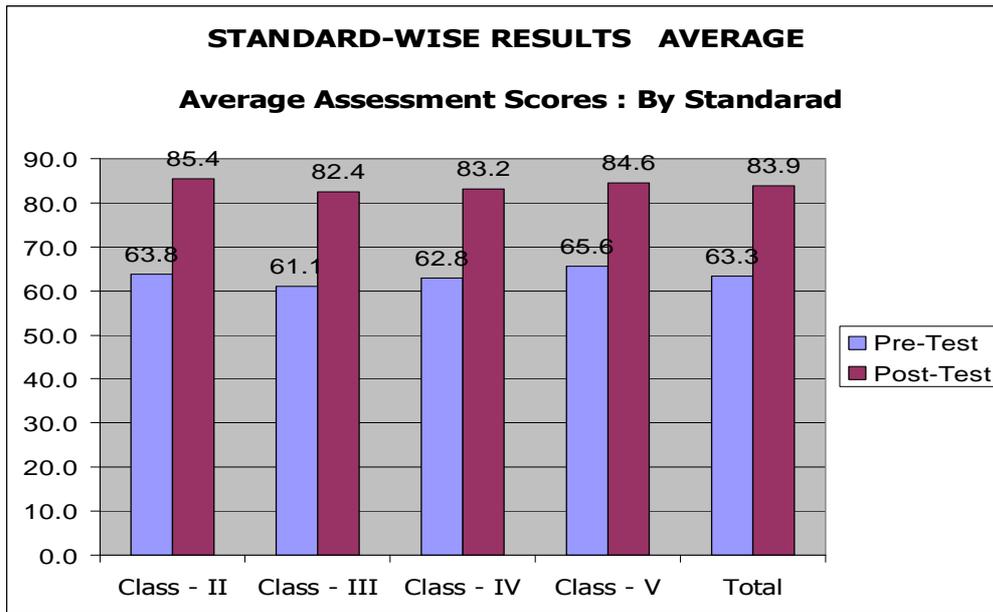
Results by Standard

Table 9

| | STANDARD-WISE SCORES | | | | | | | | | |
|----------------|----------------------|------------|-----------|----------|--------|-----------|------------|-----------|----------|--------|
| | Pre-Test | | | | | Post-Test | | | | |
| | Std. - II | Std. - III | Std. - IV | Std. - V | Total | Std. - II | Std. - III | Std. - IV | Std. - V | Total |
| Mean | 63.8 | 61.1 | 62.8 | 65.6 | 63.3 | 85.4 | 82.4 | 83.2 | 84.6 | 83.9 |
| Std Deviation | 23.5 | 22.4 | 21.8 | 22.2 | 22.5 | 13.7 | 15.2 | 14.3 | 13.4 | 14.2 |
| Rung - 01-20% | 192 | 191 | 160 | 139 | 682 | 6 | 7 | 7 | 3 | 23 |
| Rung - 21-40% | 487 | 576 | 572 | 462 | 2,097 | 42 | 59 | 53 | 29 | 183 |
| Rung - 41-60% | 1,005 | 1,067 | 988 | 819 | 3,879 | 223 | 310 | 267 | 220 | 1,020 |
| Rung - 61-80% | 1,232 | 1,275 | 1,435 | 1,331 | 5,273 | 840 | 1,078 | 1,081 | 918 | 3,917 |
| Rung - 81-100% | 1,156 | 858 | 981 | 1,172 | 4,167 | 2,995 | 2,515 | 2,737 | 2,766 | 11,013 |
| Rung - 0% | 34 | 4 | 11 | 14 | 63 | | 2 | 2 | 1 | 5 |
| Total | 4,106 | 3,971 | 4,147 | 3,937 | 16,161 | 4,106 | 3,971 | 4,147 | 3,937 | 16,161 |

There were 63 children who had scored '0' at the time of Pre-Test, and this number has come down to 5, thus indicating the success of the programme. It is clear from the above table that all the class 2 children have cleared the test on the 60th day, thus implying the effectiveness of the **programme for the beginners**.

- The above table shows that there is an overall increase in average scores across the classes.
- Class 2 recorded an increased score of 21.6 points and class 5 recorded 19 points increase.
- The Standard Deviation also shows that while in class 2 it has decreased by 10 points, in class 3 it has declined by 7 points and in 4 by 9 points and in class 5 by 8 points. This implies that the programme has succeeded relatively more in reducing the learning gap across the children in class 2 as compared to other classes.



Some children could not make it

As seen in the table on class-wise achievement it is clear that some of the children despite NNG have remained in the '0' rung indicating that, perhaps there is a need to change the strategy with them. For example, Nazia Banu of GUMPs NS Lane and Siddiq A of GULPS Modi Road could not meet the targeted results. These children scored below 20% in Pre-Test and scored '0' in the Post-Test.

Also it was found that there were 3 children who scored '0' in both the Tests.

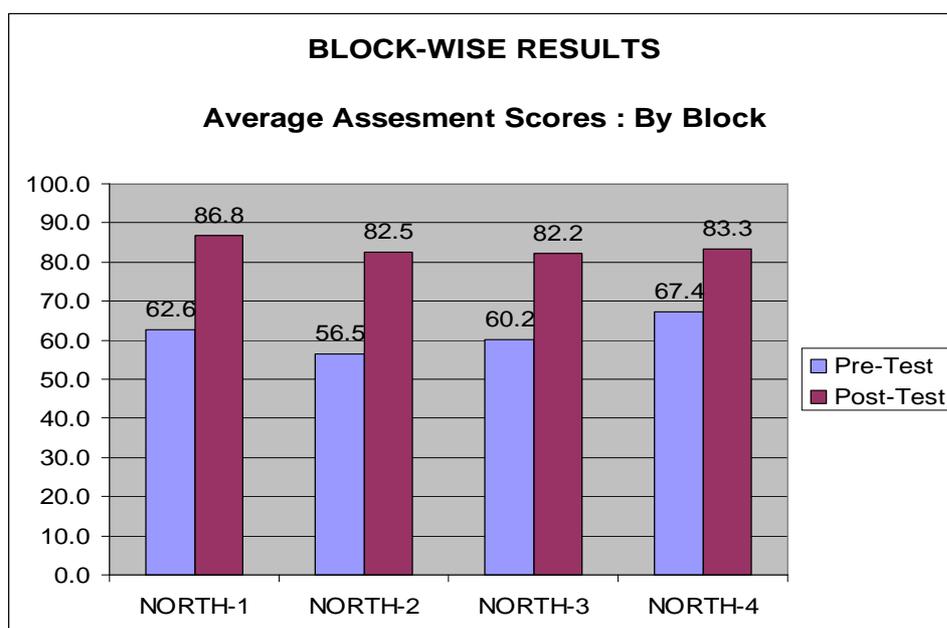
Results by Block

Results were generally consistent across all educational blocks. North 2 had a highest jump in terms of average score (i.e. 18.5) and North 4 recorded lower increase in average scores on the 60th day (11 points). All blocks showed decreases in standard deviation. There were around 63 children who scored '0' on the 20th day and this number has significantly come down to 5 on the 60th day. North 3 recorded 25 children having scored '0' on the 20th day showed that at the end of the 60th day there were 2 children who remained in that level and not being able to be mainstreamed.

Table 10

| | Pre-Test | Post-Test | Difference |
|---------|----------|-----------|------------|
| NORTH-1 | 62.6 | 86.8 | 24.2 |
| NORTH-2 | 56.5 | 82.5 | 26.0 |
| NORTH-3 | 60.2 | 82.2 | 22.0 |
| NORTH-4 | 67.4 | 83.3 | 15.9 |

On an average there was a positive difference of 26 points in N2 block followed by 24 in N1 and 22 in N3. However, N4 showed lower increase in scores as compared to other blocks.



Block-wise scores

Table 11

| BLOCK-WISE SCORES | | | | | | | | |
|-------------------|----------|---------|---------|---------|-----------|---------|---------|---------|
| | Pre-Test | | | | Post-Test | | | |
| | NORTH-1 | NORTH-2 | NORTH-3 | NORTH-4 | NORTH-1 | NORTH-2 | NORTH-3 | NORTH-4 |
| Mean | 62.6 | 56.5 | 60.2 | 67.4 | 86.8 | 82.5 | 82.2 | 83.3 |
| Std Deviation | 23.1 | 21.7 | 23.4 | 21.1 | 12.5 | 14.3 | 14.7 | 14.7 |
| Rung - 01-20% | 201 | 138 | 172 | 171 | 1 | 4 | 8 | 10 |
| Rung - 21-40% | 582 | 349 | 498 | 668 | 35 | 23 | 27 | 98 |
| Rung - 41-60% | 1,032 | 675 | 746 | 1,426 | 171 | 144 | 248 | 457 |
| Rung - 61-80% | 1,241 | 677 | 1,028 | 2,327 | 732 | 606 | 877 | 1,702 |
| Rung - 81-100% | 1,098 | 289 | 671 | 2,109 | 3,223 | 1,364 | 1,978 | 4,448 |
| Rung - 0% | 9 | 13 | 25 | 16 | 1 | | 2 | 2 |
| Total | 4,163 | 2,141 | 3,140 | 6,717 | 4,163 | 2,141 | 3,140 | 6,717 |

- Children from lower rungs in all the blocks have moved to higher rungs in all the blocks.
- While in N1, N2 and N3 this movement has increased by 3 fold so far as Rung 5 is concerned, in N4 the number of children in Rung 5 has doubled.
- The number of children from Rung 1 & 2 has drastically gone down to less than 1 % in N1 and less than 5% in other blocks.

- A significant change could be noticed in North 2, in which all the children of '0' score moved up on Post Test. N1 showed highest increase in Mean scores at the time of Post Test.

Block-specific Analysis

North 1

Table 12

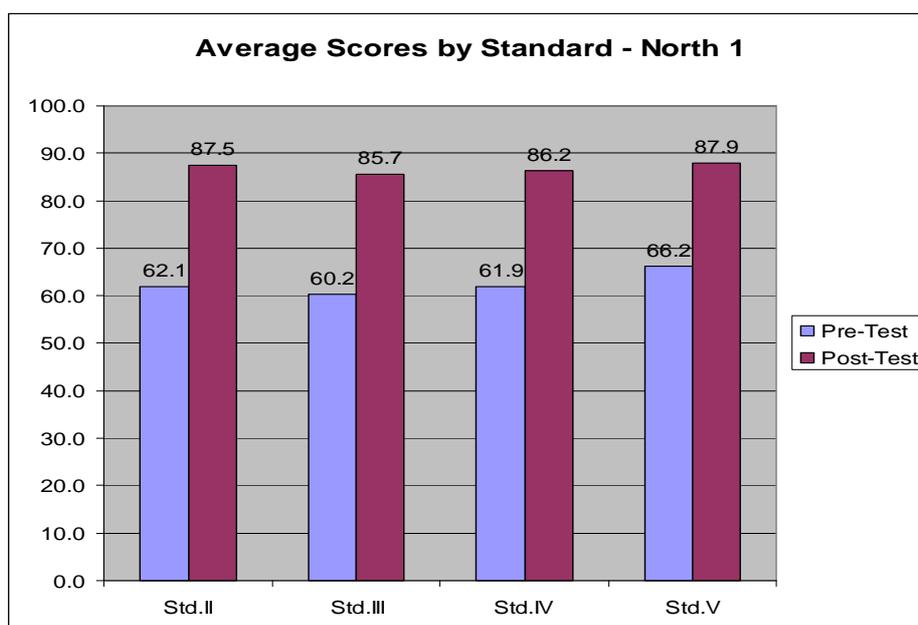
| Schools by Type | LPS | HPS | MPS |
|--------------------------------|------|------|------|
| Schools in Bangalore North 1 | 54 | 47 | 16 |
| NNG Participating Schools | 51 | 47 | 16 |
| Distribution of NNG centres | 62 | 136 | 77 |
| NNG Centre-School Ratio | 1.22 | 2.89 | 4.81 |
| % Schools participated North 1 | 94 | 100 | 100 |

Manjunath S of GKMPs Kamalanagar of Kurabarahalli cluster of N1 has scored 100% marks in NNG Post-Test. There were at least 2 students who had scored above 95% from GKHPS Goraguntepalya and GKMPs Hegganahalli in 2009.

Table 13

ENROLEMENT :BLOCK : NORTH-1

| CLUSTER | STANDARD | | | | Total |
|---|----------|-------|-------|-------|-------|
| | II | III | IV | V | |
| BYADARAHALLI | 71 | 82 | 57 | 73 | 254 |
| CHIKKABIDARAKALLU | 96 | 104 | 114 | 125 | 399 |
| HEGGNAHALLI | 127 | 121 | 135 | 124 | 451 |
| KAMAKSHIPALYA | 51 | 48 | 67 | 34 | 183 |
| KRISHNANANDANAGARA | 72 | 69 | 79 | 55 | 236 |
| KURUBARAHALLI | 82 | 88 | 78 | 76 | 276 |
| LAGGERE | 174 | 128 | 126 | 147 | 546 |
| MACHOHALLI | 93 | 100 | 115 | 105 | 360 |
| MADANAYAKANAHALLI | 61 | 70 | 63 | 68 | 226 |
| MALLASANDRA | 136 | 108 | 139 | 112 | 385 |
| PEENYA | 81 | 79 | 80 | 60 | 269 |
| RAJAJINAGAR | 18 | 11 | 19 | 22 | 61 |
| SHIVANAGARA | 22 | 33 | 31 | 33 | 111 |
| SONDEKOPPA | 40 | 34 | 37 | 36 | 134 |
| ULLALUPANAGARA | 67 | 86 | 70 | 92 | 272 |
| | 1,191 | 1,161 | 1,210 | 1,162 | 4,163 |
| 561 Children were absent for one or both test | | | | | |



North 2

Table 14

| Schools by Type | LPS | HPS | MPS |
|--------------------------------|-----|-----|-----|
| Schools in Bangalore North 2 | 23 | 25 | 12 |
| NNG Participating Schools | 22 | 21 | 12 |
| Distribution of NNG centres | 39 | 64 | 48 |
| NNG Centre-School Ratio | 2 | 3 | 4 |
| % Schools participated North 2 | 96 | 84 | 100 |

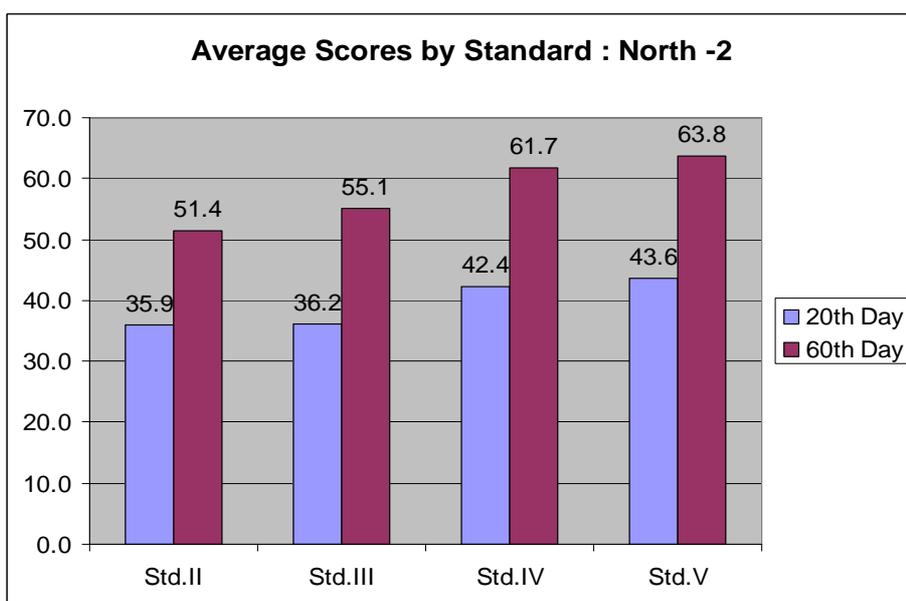
Examples like Benjamin B of GKLPS Vishwanath Nagenahalli, Shwetha of GKGHPS Srirampura, Kusum of GKMPS Hebbal and few more have scored above 90% in the Post Test. These were the children who were in Rung 1 at the time of Pre-Test.

Table 15

ENROLEMENT :BLOCK : NORTH-2

| CLUSTER | STANDARD | | | | Total |
|----------------|----------|-----|-----|-----|-------|
| | II | III | IV | V | |
| HEBBAL | 229 | 211 | 197 | 202 | 839 |
| JALAHALLI | 65 | 66 | 57 | 56 | 244 |
| MALLESWARAM | 130 | 147 | 138 | 167 | 582 |
| PGHALLI | 6 | 5 | 11 | 5 | 27 |
| PRAKASHNAGARA | 17 | 41 | 41 | 41 | 140 |
| SHESHADRIPURAM | 31 | 31 | 30 | 41 | 133 |
| SRIRAMAPURA | 83 | 67 | 77 | 64 | 291 |
| YASHWANTHPURA | 69 | 73 | 64 | 64 | 270 |
| Total | 630 | 641 | 615 | 640 | 2,526 |

366Children were absent for one or both test



North 3

Table 16

| Schools by Type | LPS | HPS | MPS |
|---------------------------------------|-----|-----|-----|
| Schools in Bangalore North 3 | 29 | 41 | 15 |
| NNG Participating Schools | 25 | 31 | 14 |
| Distribution of NNG centres | 38 | 84 | 73 |
| NNG Centre-School Ratio | 2 | 3 | 5 |
| % Schools participated North 3 | 86 | 76 | 93 |

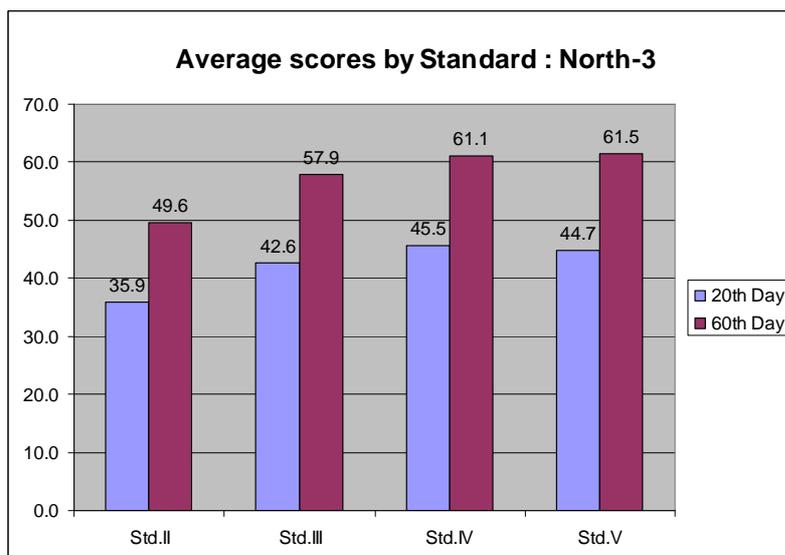
Umaiz Ahmad, Abdul Salman, Harish Kumar and Maruthi from GULPS Saitpalya, GULPS Mackan Road, GKHPS Jeevanahalli are some students who have achieved more than 90% scores in the Post Test. These were some of the children whose scores were in the lower rungs.

Table 17

ENROLEMENT :BLOCK - NORTH-3

| CLUSTER | STANDARD | | | | Total |
|------------------|----------|-----|-----|-----|-------|
| | II | III | IV | V | |
| BANASWADI | 60 | 61 | 63 | 50 | 234 |
| D.J. HALLI | 230 | 209 | 207 | 209 | 855 |
| FRAZER TOWN | 121 | 119 | 101 | 93 | 434 |
| J C NAGAR | 152 | 119 | 128 | 127 | 526 |
| KAVAL BYRASANDRA | 229 | 203 | 215 | 209 | 856 |
| OPH Road | 18 | 17 | 16 | 20 | 71 |
| POTTERY TOWN | 86 | 80 | 83 | 81 | 330 |
| VASANTHAGAR | 67 | 59 | 52 | 59 | 237 |
| Total | 963 | 867 | 865 | 848 | 3,543 |

385 Children were absent for one or both test



North 4

Table 17

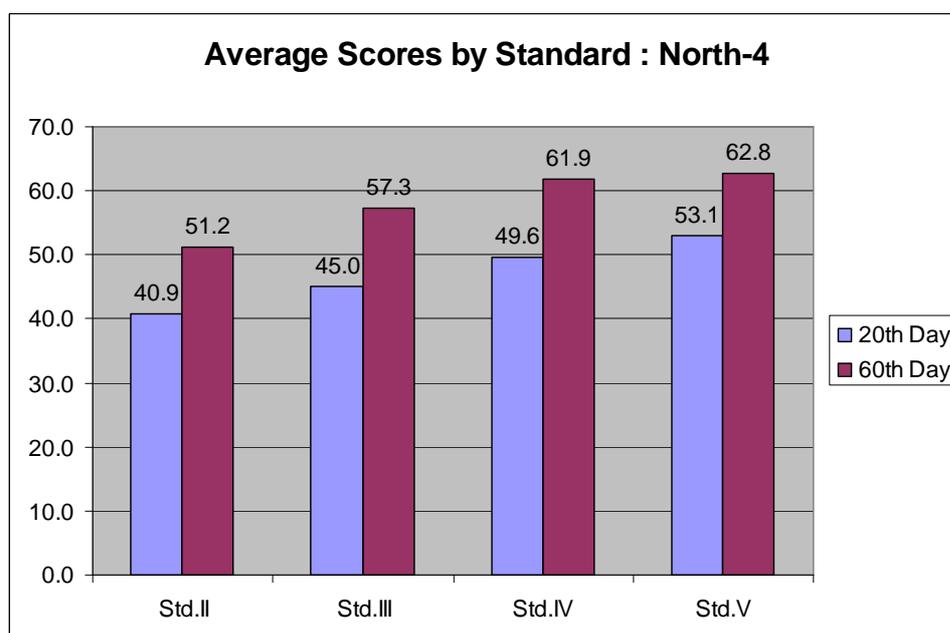
| Schools by Type | LPS | HPS | MPS |
|---------------------------------------|-----|-----|-----|
| Schools in Bangalore North 4 | 150 | 87 | 14 |
| NNG Participating Schools | 122 | 87 | 14 |
| Distribution of NNG centres | 62 | 136 | 77 |
| NNG Centre-School Ratio | 170 | 200 | 57 |
| % Schools participated North 4 | 81 | 100 | 100 |

Children like Shagiya H, Suresh Thapa and Kruthika PC from GKHPS Abbigere, GKLPs Shettigere and GKMPs T Dasarahalli have scored 100% in the Post-Test. Like in other blocks these were the students who have jumped from Rung 1 to Rung 5 in the same academic year.

Table 18

| ENROLEMENT : BLOCK - NORTH-4 | | | | | |
|-------------------------------------|----------|-----|-----|-----|-------|
| CLUSTER | STANDARD | | | | Total |
| | II | III | IV | V | |
| ABBIGERE | 94 | 97 | 107 | 89 | 387 |
| AGRAHARA LAYOUT | 115 | 109 | 125 | 92 | 441 |
| BAGALUR | 81 | 95 | 97 | 86 | 359 |
| BYATARAYANAPURA | 206 | 219 | 175 | 180 | 780 |
| CHIKKAJALA | 119 | 105 | 92 | 107 | 423 |
| DODDA BYLAGERE | 108 | 99 | 116 | 93 | 416 |
| HESARGHATTA | 70 | 67 | 55 | 72 | 264 |
| HUNASAMARANAHALLI | 100 | 107 | 114 | 104 | 425 |
| KAKOLU | 76 | 99 | 114 | 78 | 367 |
| KHUDREGERE | 102 | 104 | 112 | 106 | 424 |
| KODIGEHALI | 153 | 159 | 167 | 141 | 620 |

| | | | | | |
|---|-------|-------|-------|-------|-------|
| MARALUKUNTE | 39 | 35 | 31 | 21 | 126 |
| MATHAHALLI | 64 | 74 | 65 | 85 | 288 |
| RAJANAKUNTE | 105 | 101 | 100 | 84 | 390 |
| T DASARAHALLI | 90 | 153 | 150 | 117 | 510 |
| YELEHANKA NEW TOWN | 221 | 196 | 213 | 211 | 841 |
| YELEHANKA OLD TOWN | 152 | 129 | 151 | 127 | 559 |
| Total | 1,895 | 1,948 | 1,984 | 1,793 | 7,620 |
| 798 Children were absent for one or both test | | | | | |



Limitations of NNG:

1. Selection criteria – The teachers selected and enrolled the children for the program. Since there was no baseline testing, it could be possible that some of the children enrolled did not require the program. And it is also possible that children who required intervention could have been ignored.
2. Teachers implemented the program in vastly different ways making it difficult to identify 'exactly what worked'. This was mainly due to time issues and also some teachers had focused more on games while few others on work book exercises.
3. Children attendance is one of the significant factors that impact the program.

Recognizing the limitations in mind, this report has explored the results of the program as comprehensively as possible.

Concluding Remarks:

- Data on enrolment clearly shows that there were 18413 children identified by the teacher's specific to class and school. It was also found that nearly 11% of the children who were part of the initial enrolment list did not appear for the Post test. This pattern seems to hold same across the classes.
- North 4 reported highest enrolment to the programme (46%) and North 2 reported 26% enrolment out of total enrolment of children.
- 79% of the children were present in both, Pre and Post tests.
- 1% of the children were absent on the Pre-Test day out of the total number of children selected and listed by the participating North schools.
- Children from below 60% performance group have moved out of that and this number has come down from 41% to 7% in Post Test.
- As contrast to that there is a sharp increase in number of children in the Post-Test to 92% as compared to Pre-Test (58%)
- It is clear that the Post-Test scores are positive as compared to Pre-Test especially in the lower rungs. That is children who were low scorers in the Pre-Test have moved forward in the Learning ladder by the end of the programme.
- There were 63 children who recorded to have scored '0' and this number came down to 5 at the end of the programme.
- There is a definite movement of children from lower rungs of learning achievements to higher rungs from Pre-Test period to Post-Test period.
- The effectiveness of the Programme, if looked from the point of those children who felt that Maths is a difficult subject to understand, the results show positive change in that segment. As seen in the above class wise Table, there were 63 children who scored '0' at the time of the Pre-Test. This number has come down to '5' by the end of the Post-Test. A disaggregated level analysis show that at least 50% of the children from this group have scored more than 50% marks at the end of the programme. There were as many as 14 children who had scored above 70% at the end of the programme.
- The programme seems to have succeeded in helping more children to attain the math competencies of Four Operations and quantitative reasoning as compared to numeracy and mental math.
- There were 63 children who had scored '0' at the time of Pre-Test, and this number has come down to 5, thus indicating the success of the programme. It is clear from the above table that all the class 2 children have cleared the test on the 60th day, thus implying the effectiveness of the **programme for the beginners**.
- Though negligible there were some children who despite NNG have remained in the '0' rung indicating that, perhaps there is a need to change the strategy with them and some who scored '0' in both the Tests.
- Children from lower rungs in all the blocks have moved to higher rungs in all the blocks.
- While in N1, N2 and N3 this movement has increased by 3 fold so far as Rung 5 is concerned, in N4 the number of children in Rung 5 has doubled.
- The number of children from Rung 1 & 2 has drastically gone down to less than 1 % in N1 and less than 5% in other blocks.
- A significant change could be noticed in North 2, in which all the children of '0' score moved up on Post Test. N1 showed highest increase in Mean scores at the time of Post Test.